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OF  
THE ROYAL INSTITUTE OF BRITISH ARCHITECTS

VOL. VII. NEW SERIES, 1891

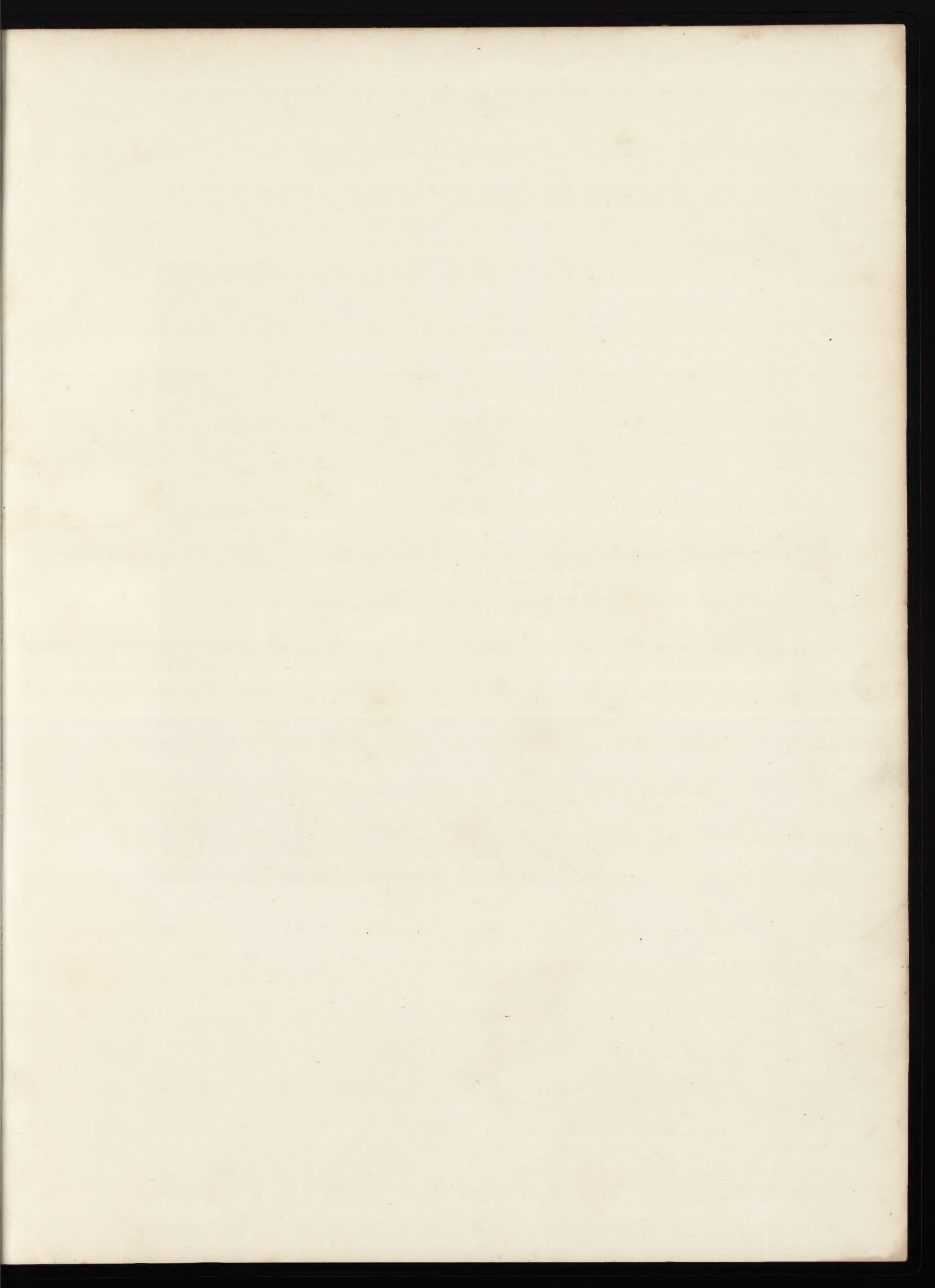


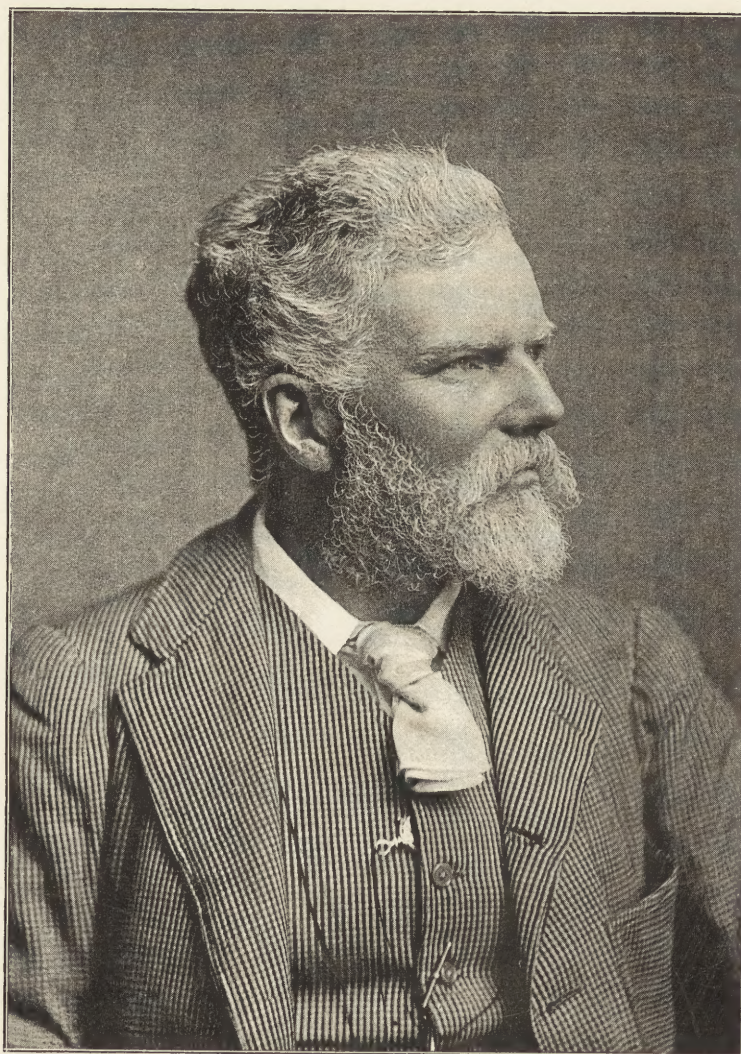
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*From a recent photograph.*

ALFRED WATERHOUSE, R.A.

PRESIDENT 1888-91. ROYAL GOLD MEDALLIST 1878.



# The Royal Institute of British Architects

INCORPORATED SEVENTH OF WILLIAM IV. AND FIFTIETH OF VICTORIA

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## TRANSACTIONS: VOL. VII. NEW SERIES

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FIFTY-SEVENTH YEAR OF FOUNDATION

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LONDON

PUBLISHED AT THE ROYAL INSTITUTE OF BRITISH ARCHITECTS, 9 CONDUIT STREET, HANOVER SQUARE, W.

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1891





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[*Entered at Stationers' Hall*]



# The Royal Institute of British Architects

INCORPORATED SEVENTH OF WILLIAM IV. AND FIFTIETH OF VICTORIA

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## THE SESSION 1890-91.

THE OPENING MEETING of the Session was held on Monday, 3rd November 1890, when Mr. ALFRED WATERHOUSE, R.A., delivered his third Presidential Address,\* in which he acknowledged the honour conferred on him by the Institute in having elected him for an additional year of office.

The PRESIDENT congratulated the Institute on possessing Premises much the better for the additions made to them by the Honorary Secretary during the recess. The meeting-room was certainly better lighted than it ever had been before, and experience might show that it was better ventilated. It was now a convenient room in which to study and consult books. The original and restricted library, and the old council-room to be thenceforth chiefly used for the storage of the volumes forming their ever-increasing and most valuable collection, would make excellent committee-rooms; while the arrangements for the permanent staff and Council downstairs could hardly be much improved so long as the Institute occupied hired Premises.

It was gratifying to record that the direct representation of Architecture upon the General Council of the Imperial Institute—a matter to which, in common with his lamented predecessor in the Chair, he had referred in a previous Address—had been cordially conceded; the Councils of the Royal Academy of Arts and of the Royal Institute of British Architects would, in due course, send one representative apiece to the Governing Body of the Imperial Institute.

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\* The Address, in its entirety, is printed in *The R.I.B.A. Journal*, Vol. VII., pp. 21-35.

A communication made to the Council that day would also be received with interest and satisfaction. All were aware that a sister of the late OWEN JONES presented a sum of money to the Institute for the purpose of endowing a Travelling Studentship, worth annually £50, in memory of her distinguished brother. That lady, who died in September 1890, had bequeathed the residue of her estate to the Institute as an addition to the original endowment.

*The Examinations.*—Since the commencement of the Session 1889-90 the new system of Progressive Examinations had come into operation. Preliminary Examinations of candidates qualifying as Probationers had been held in several non-metropolitan centres; sixty-two had been declared exempt, and seventy-seven others had passed. Moreover, twenty-seven of the candidates who had applied to be admitted to the Preliminary Examinations in November 1890 had been exempted—making a total of 166 qualified in due time to come up for the Intermediate Examinations, the first of which was to be held that month. Fifty-four gentlemen had passed the “Qualifying Examination” entitling them to become candidates for Associateship. If a man was to take a creditable position as an architect in the future, he must begin by passing those examinations. It seemed to the PRESIDENT as essential at the present day to have passed them, as it was in former years to have spent a certain period in an architect’s office as a pupil. He did not say that both courses were not still desirable, even necessary; but he thought it would soon be found that the passing of those examinations was absolutely essential to every one who hoped to practise the profession of architecture.

Mr. WATERHOUSE then drew attention to a memorial from colleagues in Edinburgh, supported by many distinguished names, to H.M. Commissioners for the Scottish Universities, recommending the establishment of a curriculum in Architecture at the University of Edinburgh, and the institution of a degree or other University distinction for those who had successfully pursued it. The memorialists suggested a proper course of study to lead to such a degree, pointing out the advantages likely to accrue if effect were given to their proposals; and they made appreciative mention of the Institute Examinations. It was a cause of gratification to those who had architectural education at heart to find their Edinburgh brethren so anxious to continue what the Institute had begun, and even to go beyond it.

*Bills of Quantities.*—In his last Address the PRESIDENT referred to the impropriety of expecting builders competing for the execution of contracts to verify the correctness of the Quantities on which they tendered—a practice adhered to by H.M. Office of Works after it had been discontinued by London



architects generally. That led the Council to address the Commissioners of Works on the subject, and brought, he was happy to say, a speedy reply to the effect that the practice would be discontinued. It was to be hoped that the high example thus set would be followed by those who still adhered to what could not but be considered an objectionable practice, not justified by equity, and calculated to bring the functions of the Quantity Surveyor into disrepute.

*Deputations from Building Trades.*—The Council had received two deputations from several of the Building Trades, asking for the insertion of certain clauses into the “Heads of Conditions of Builders’ Contracts”—first, to prevent the subletting of any portion of the work; secondly, that all labour employed by the contractor should be of the best quality; and thirdly, that the contractor should not pay less than the recognised or trades-union rate of wages, and should observe all recognised rules or customs as to working hours. The proposals met with the consideration which they merited, without the Council seeing any way to take collective action in the matter. Mr. E. T. HALL, in *The R.I.B.A. Journal*,\* had shown in what trades subletting was practised in London, and to what extent. He took the view that, when subletting was allowed in the interests of one’s clients—as, for instance, when stone was wrought in or near the quarries, and the general contractor, knowing that such a permission would be granted, reduced his tender accordingly—it might be their duty to allow it, especially when, though it might deprive the London masons of some work, it gave work to others probably equally deserving. Few, he thought, would disagree in such cases with Mr. HALL.

*Building Legislation.*—Among the subjects which had engaged earnest attention during the past Session, none was of more importance, in his opinion, than the revision of the Acts relating to building operations in the Metropolis. The general public might view the subject with apathy, as not understanding how vitally it affected comfort, health, and well-being; in fact, the very magistrate on whom devolved the administration of the said Acts in cases of dispute was said to hate the sight of the District Surveyor when he brought his unfathomable technicalities into Court. When, therefore, apathy, or disinclination to unravel the threads of a complicated and perplexing subject, was so general—though the subject itself was essential to the well-being of the community at large—it was the duty of men whose education and experience fitted them above all others for the task, to help those engaged in

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\* Vol. VI., pp. 392-98.

the framing of such Acts with their advice and assistance. Now, that was precisely what the Institute had been doing.

A Paper on "Building Legislation," read by Mr. JOHN SLATER, had been the theme of, and prelude to, some interesting discussions. It had led to correspondence conducted by those who might be called specialists in the matter, and who seemed to be unanimously agreed that the time had arrived for the codification and thorough amendment and simplification of the some fifteen or twenty Acts and Amendments of the same which regulated building operations in the Metropolis. A warning voice, however—that of Professor AITCHISON—had been raised against striving after perfection, by making the cost of houses too great for those who were to live in them. Others objected to building regulations being too definite, so as in some cases to become tyrannical and absurd; but it seemed to the PRESIDENT that because an existing definition might be found to work in that way in practice—as, for instance, the clause in the Act which limited the sum of the openings in a wall to half its total area—it was a reason for the amendment of the clause rather than for its exclusion. The fault, in his opinion, lay not with being too definite, but with the definition not being broad enough to meet varying contingencies. The Act of 1855, having been framed chiefly for preventing the spread of fire from one combustible wooden-floored building to another, was out of touch with fire-resisting construction, which ought, when properly applied, to allow of an increase in the cubic contents of buildings beyond the area at present prescribed, at least where the building did not contain goods of an inflammable description. The Act did not allow of the increased amount of glass called for by the ever-increasing pollution of our atmosphere; and, on the other hand, did not make due provision against the danger from fire incident to the use of lifts. It did not realise the greatly extended requirements of the present day; nor the extended building knowledge—the knowledge, for instance, of the treacherous nature of stone and iron in case of fire. The Act did not deal with important questions affecting the rights and obligations of adjoining owners; it did not concern itself, except by implication, with the underpinning of party-walls and of adjoining structures in cases where the new structure, going below the old one, affected the safety of the latter, and involved such a procedure. It ignored sanitation; and, except by veto of the County Council, did not trouble itself about the formation of new building estates, where, of course, the evils most to be deplored in streets and thoroughfares could be most readily prevented. Mr. SLATER urged, with reason, the necessity either of making the Building Acts



of the future sufficiently expansive to meet such cases, or of giving the District Surveyors a discretionary power to enable them to deal with special cases in a practical way—and probably his first alternative would present, in practice, the fewest difficulties. The urgency of the subject had been pressed upon them lately by the “London Council (General Powers) Bill,” which, appearing at first as if it chiefly related to a bridge at Barking Creek and the acquisition of a new park for South London, had been in reality of much more widespread interest. It proposed, in fact, important amendments in the Metropolitan Building regulations, some of which could not be looked upon with favour. Action had been thereupon speedily taken, and a memorial addressed to the London County Council on the subject. The Council of the Institute had pointed out that many of the changes proposed were of temporary expediency, and many wanted further consideration, as, for instance, those clauses affecting sites at the corner of two streets, in one of which the line of frontage had to be set back, where the owner of the corner site would have had to set back also without compensation; and those affecting the heights of new buildings. They had further pointed out the desirability, when an application was refused, of the grounds of the objection being stated, so as to enable the applicant to amend his designs to meet such objection. They had also respectfully remonstrated against that indirect mode of introducing legislation seriously affecting private rights and questions of principle; and had urged the advantage of promoting a thorough amendment and consolidation of the Metropolitan Building regulations. Some of those recommendations had been accepted by the London County Council, and the Bill had been amended accordingly.

One of the most important provisions of the new Act was the establishment of a Court of Appeal in questions of lines of frontage, &c. The Court was to consist of three members: one appointed by the London County Council, one by the Council of the Institute, and another by that of the Surveyors' Institution. The County Council deserved praise for the initiation of that reform—or rather revival, under fresh conditions, of a tribunal established by the Act of 1844, but which from its peculiar constitution became a dead letter; and the PRESIDENT hoped it would work so well in practice as to show the propriety of giving to such Courts greatly extended powers in the future. The Act also fixed for the first time in London a limit to the height of new buildings, not being the rebuilding of existing structures of a greater height. Ninety feet was the limit, exclusive of two storeys in the roof, and of exceptional features, such as ornamental towers or turrets and dormers. That should satisfy even the most aspiring; if it did not, there was still the

right of appeal to the tribunal before referred to. The PRESIDENT alluded with pleasure to the part taken by the Institute in criticising, amending, and ultimately aiding, the passing of that Bill. As an entirely disinterested Body, and yet one most fully able to appreciate the tendency for good or evil likely to result from any change in building regulations, it was only proper that the opinion of the Institute should be heard and well-considered at such a juncture; and it was gratifying to reflect that in that case the Institute was represented by Mr. CATES, who—its *locus standi* having been admitted—claimed, and successfully sustained, the right to be heard personally on behalf of the Council, and to adduce evidence in support of the Institute petition, without the costly intervention of counsel.

He could not but feel, however, that even were the most perfect Building Act to be obtained for the regulation of practice, it should be the function of some one—or rather of some collective body—to take a broad artistic view of that immense chaos called London; and, as opportunities arose, to point out in what way it could be improved as a work of art. The members composing such a body should be men of business as well as artists, or their recommendations would soon cease to have any practical value. In laying down the line of a new street, it would be their duty to see that its extremities either ended in some existing building worthy of closing the vista—as, for instance, the Strand, in the Church of St. Mary; or that a site was reserved for some future erection with that object in view. It would be their duty to see that the best sites along its course were reserved for buildings of a character becoming their position, and that a flagrant want of harmony was not suffered in contiguous elevations; and while always dealing indulgently with such as were modest and refined, the tribunal would be resolute in refusing the acceptance of designs of vulgar ostentation—creations of the nightmare school, of which, unhappily, examples had been already thrust upon them. Indeed, there might be more, if there were no authority to check this worst form of inflated advertisement—the worst because it involved the prostitution of a noble art; and, once erected, such erections were not easily got rid of. He was not forgetful of Professor KERR's pathetic inquiry, "If 'Heaven has made us Philistines, how can we help it?'" But this was hardly a question of a man's right to do what he liked with his own, provided he did not injure his neighbour. A street was public property, made not only for the use, but for the *enjoyment*, of the public, and it could not be an enjoyment so long as it was vulgar and ugly, or even monotonous. He pleaded for the creation of some responsible body of men, by position, education, and



cultivated taste, specially fitted for the task, whose main duty should consist in advising upon and controlling, from an artistic point of view, those works on which the future of London so much depended. He repeated the words he had used in his Address of last year, that an Architectural Council, to be appointed by the Government and to be partly composed of professional men, was wanted in London. It was most difficult for those who had had no technical training to judge correctly of the probable effect of a contemplated building from an inspection of the drawings prepared for its erection. He pleaded, moreover, for the public exhibition of the plans of all Metropolitan improvements prior to any final decision being taken upon them. Such a course would tend to create an intelligent interest in Improvements which at present did not exist in London, and it would enable those who had to pay for them to consider in time if the proposals were good, practically and æsthetically, or otherwise. A tribunal had been obtained before which certain building cases defined in the "London Council (General Powers) Act" would be tried; and if success attended the labours of that tribunal, other and perhaps more important matters relating to Building might be referred to its judgment. So far, so good. But more was wanted, namely, an Architectural Council for National Works, which should be intrusted with the consideration of proposed improvements of an artistic character, and of all questions relating to their initiation and execution.

*Students' Work.*—The system recently inaugurated of publishing criticisms on the work of students competing for the various scholarships and prizes offered by the Institute itself, or by others under its administration and direction, was to be regarded as one of great value. It showed the unsuccessful student wherein he had failed, and so guided him to a better chance of success in the future, pointing out even to the winners how to attain greater excellence, if willing to listen to the friendly advice of experience. He again ventured to remark, with reference to the work of those to whom Travelling Studentships were awarded, that what the Council desired to see was not mere evidence of their industry—that was seldom or never wanting—but a greater desire to make quality, apart from draughtsmanship, and not mere quantity, their aim. The student nowadays seemed sometimes possessed of the restlessness begotten of the locomotive-engine: he stayed, it might be, but a day in a place; in that day, to be sure, he did a marvellous amount of sketching, and he contrived to visit in the time which he had to devote to his Studentship an astonishing number of interesting buildings, the most salient features of which he transferred to paper. The PRESIDENT did not see, however,

as often as he would like, that the student had sat down before a building to lay siege to it, with the determination to make it his own before he had done with it—to enter into the spirit of its builders, and to seek to discover their way of arriving at the ends they had had in view. There should, in his opinion, be among the students a little more of the thoroughness which characterised the work of the French students, whose magnificent studies displayed in the Galerie Rapp, in last year's Exposition, so much impressed those who had had the opportunity of examining them. He said "a little more," because in France, perhaps, that work was carried out with too great elaboration. Still, he would have students make themselves so conversant with any work they analysed as to be able to pass an examination on its construction and features; and he thought it would be well if the knowledge thus previously acquired by the candidate in the study and delineation of some ancient example were put to the test more strictly than appeared to be the case at present. Those who read for their amusement, or for their fancied instruction, did not generally read half so carefully as those who knew they were going to be examined on what they read; and so he believed it was in objective drawing. If the painter-student knew he was going to be judged, not by his actual study from the life, but by what he could put of it on paper from memory afterwards, would not his attention be quickened to every subtlety of curve and proportion? Would he not become by such practice the readier artist? If the architect-student knew that it was not by the mere number and beauty of his sketches, and by the accuracy of the measured drawings of old edifices, that he would satisfy those who had sent him forth on his travels, but by the proofs he was able to afford that he had absorbed and digested what he had seen, student-work would be more thorough, the PRESIDENT thought, and the men themselves in some cases would be more ready designers after having had such preparation. Having got the ancient examples into their heads, instead of merely into their sketch-books, they would learn to lean, not on illustrations and other extraneous help, but on what had become a part of themselves, and so prove not mere copyists, but self-reliant and original designers. Of course, if such careful analysis of a single example of architecture was recommended to the student, it was highly important that he should know beforehand what buildings would best repay the time thus devoted to them; and it would be a work of very great interest and utility if those best qualified for the task were to catalogue such buildings, giving at the same time their date and most noteworthy features and characteristics, not disdaining to mention also their distance from the



nearest railway station and the existence and name of the neighbouring inn, if any. There was abundance of such information in a scattered form in the professional journals; and he did not forget the substantial work which the Architectural Association some time ago carried out for certain localities. Still, a complete and concise list would be of inestimable service to every one; and if divided into counties, each with a short introduction as to the county's leading architectural characteristics, and with a good index to the whole, would be of easy reference. It would be of special value to the student, who should, of course, be encouraged to go where he could study good architecture, rather than redundant and often misapplied elaboration of architectural details.

The President of the Royal Academy, in his recent discourse on Spanish Art, devoted much of his attention to architecture, a difficult subject, but treated by him with perspicuity and breadth of view. The interest which that Address awakened had led Mr. WATERHOUSE to visit Spain a month or two later, and to notice the justness of the conclusions arrived at by their distinguished Honorary member, who had shown therein his grasp of the intricacies of their art. Spain was a country which all architects ought to see, though the difficulties of locomotion and hostelry were still such that few could hope for more than a partial acquaintance with its architectural wonders. For the reasons pointed out by Sir FREDERIC LEIGHTON, the visit ought to be postponed until the student's views were formed, or he might be led away by much that was as pernicious as it was alluring.

*Architectural Training.*—A question was often asked as to the best mode of training a youth intended for the profession of architecture. How should the early days of one who intends to study architecture as a calling be spent to the best advantage? To such the PRESIDENT replied: "He should have received in his schooldays some preliminary training of a scientific as well as of an artistic character. He should learn early to understand and appreciate the beauties of a fine building,—of the civic and domestic edifices, the grand cathedrals and churches, the noble streets and open spaces, with which many a city in this country is endowed. He should be taken to museums of 'Comparative Sculpture' such as the initiative of VIOLLET-LE-DUC created in the Trocadéro; and, in default of similarly arranged educational institutions at home, to the sculpture galleries of the British and South Kensington Museums. In fine, he should, in his early pliable days, be shown the works—or casts or drawings of the works—of the great architects of various countries, and thereby acquire an insight into the magnitude, the

“ nobility of the career upon which he is about to enter. At the same time his  
 “ ordinary education—the ordinary education of an English gentleman—  
 “ should not be neglected. He must pass the matriculation examination of  
 “ a university, or the local examination conducted under the authority of a  
 “ university ; or he must obtain some testimonials of proficiency granted  
 “ by well-known educational bodies. Then, armed with such letters of intro-  
 “ duction, he should come to the Royal Institute of British Architects, where he  
 “ would be cordially received ; and thereupon, after the necessary inquiries as  
 “ to his certificates, and after examination of his powers of draughtsmanship,  
 “ he would be admitted a Probationer. His name would be entered on the  
 “ Register as one intending to qualify for admission to the Class of Students,  
 “ and afterwards to the Class of Associates, of the Institute.”

His next proceeding was to be articulated, say for three years, to some practising architect on the conditions suggested in the Forms of Articles of Pupilage \* which had recently been published—a most important item of which stated “that with the object of enabling the pupil to qualify himself for “passing the examinations for Studentship and Associateship of the Royal “Institute of British Architects, he, the Principal, shall and will allow the “Pupil such absence as he, the Principal, shall deem reasonable for the purpose of attending lectures, classes of instruction, and the said examinations.” During the term of his articles the pupil, or rather the Probationer to whom the PRESIDENT was alluding, would have to prepare the “testimonies of study” [described in *The R.I.B.A. Kalendar*] which he had to submit to the Board of Examiners before he could be admitted to the Intermediate Examination ; and to assist him in the preparation of those “testimonies” in London he would, if properly advised, become a member of the Architectural Association, attend its classes, periodical visits to buildings, &c., and thus mix with others engaged in a similar course of study. During all this period, the Reference Library of the Institute was open to him, and he could borrow books not only from the Lending Library of the Architectural Association, but also from that of the Institute. At the end of his articles he passed the Intermediate Examination, was qualified as a Student of the Royal Institute of British Architects, and his name and address were inserted in the Register of members of the Institute, and published in the *Kalendar*. He afterwards competed for the prizes offered by the Association, and then for those offered by the

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\* Published at the Office of the Institute : (1) A Form of Articles of Pupilage for payment of the premium in one sum ; and (2) an alternative Form for payment of the premium by instalments. The Forms are made out for immediate execution, blanks being left for names, titles, dates, &c.



Institute. He gained a prize, perhaps a studentship, which enabled him to travel in France or Italy, or even as far as Greece. He returned to England, entered an office as assistant, prepared his probationary work for the Final Examination to qualify for candidature as Associate; he was admitted, he passed the examination, was registered Associate, and instead of being a mere stranger to those whom he would thereafter call his professional brethren, he was known to many of his elders, and counted among his contemporaries numerous friends. Such a record of the younger days of an architectural student seemed a fairly complete one. No President of the Institute, forty, or even twenty years ago, could have told a similar tale. Mr. WATERHOUSE could remember nothing in his early days as a pupil which approached the facile and systematic training of the course now laid down by the Institute for admission to its ranks—ranks which he thought must ultimately include the entire profession of architecture in the United Kingdom.

He had endeavoured to describe what the education of the young architect should be upon existing lines. Possibly, in a not distant future, it might be found better to use a course of instruction somewhat analogous, for instance, to that pursued by Professor WARE\* in New York, as a preparation for entering an architect's office, than that theoretical instruction of the sort just indicated should go on *pari passu* with pupilage. For a pupil to reap the full benefit of his time in an office, he should as soon as possible find himself set to practical work, and work of that sort in a busy age could hardly wait for one who spent a considerable portion of his time in abstract study. After his *class* work was once completed, his powers would be so strengthened thereby as to allow of his entering upon *office* work with an intelligence unknown to the ordinary pupil of the present day; and his term of pupilage might be greatly shortened were it to follow, rather than be contemporaneous with, theoretic training.

*The Architectural Association (London).*—For many years the professional education of architects' pupils had been assisted by the well-directed efforts of the Architectural Association, which had received a flattering encomium from VIOLLET-LE-DUC in 1872, at a time when numerically it was not much more than half as strong a body as it was to-day. Its method consisted in the members helping themselves and each other; and no better could be devised. The particulars of its *modus operandi* were well known to all; but he could not omit to mention that the General Committee of the Association

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\* Mr. Waterhouse commended Professor Ware's Paper on "The Instruction in Architecture at the School "of Mines," read before the Alumni Association of Columbia College, 12th June 1888; and urged those interested in the subject to read it.

recently formulated a more complete system of instruction to meet the requirements of the Institute Examinations, the programme of which course was to include the study of the principles of design and construction on the drawing-board in class, a practice pursued in the Royal Academy Schools with success.

He reiterated what he had said last year from that Chair, that the Institute should, if the way were made clear, give substantial help to those who, during a long and prosperous period, had shown an earnest determination to help themselves. But how or in what manner that helping hand should be offered to the junior Body did not appear to have received due consideration from those most concerned. At the present moment the educational work done by the Association afforded no great material assistance to the Institute. The relative position of the junior and senior Bodies in the matter of recruits had undergone, or at least was undergoing, a great and sensible change. The Institute had emerged from the state of a dilettante society into one of an eminently businesslike kind, with recognised functions of a public as well as professional character. The Architectural Association, on its own showing, did not appear to possess at present the means to adequately fulfil the functions of a teaching body. In former days, a student first joined the Association, and then, in the course of years, the Institute. The position of affairs might now be said to be reversed. The aspirant's first thought was to qualify for registration as a Probationer of the Institute; his next, perhaps, if he lived in London, was to join the Association for the purpose of qualifying as a Student, and afterwards as an Associate, of the Institute. Such being the case, it behoved them to look the new aspect of their relative positions in the face, in a businesslike way.

The General Committee and the subordinate Committees of the Architectural Association were largely, if not mainly, composed of members of the Institute; and so were the instructors in most of the classes. The Association held its general meetings in the Institute rooms. Every member of the Association under twenty-three years of age had the use of both the Reference and the Lending Libraries of the Institute; and any member over that age, if he asked permission, was allowed the use of the Institute Library, which, as a matter of fact, was open all the year round to any architectural student properly recommended. The Presidential Addresses and many of the Papers delivered to the Association were published in the Institute Journal, and the pages of that Journal were open to members of the Association on almost the same conditions as to members of the Institute. The PRESIDENT or a repre-



sentative of the Association had a seat at the Council table of the Institute ; in fact, it had the right, under the By-laws, to be there represented. The actual connection between the junior and senior Bodies was much closer, much more intimate, than the majority of those who talked about the subject were aware ; and the Institute had never seen cause to regret the closeness of that connection. It saw, with interest and approval, that the Association was asking itself the pertinent question whether the facilities it afforded to students desirous of working in its classes were sufficient for the requirements of the time, and whether several things which involved considerable outlay of Association funds might not with advantage be abandoned, with a view to augmenting the sum available for teaching purposes.

He had been much struck with the excellence of the lectures which the Association obtained from its members and others. There was a Paper read last Session by Mr. FRANK T. BAGGALLAY on "Angles and Terminal Features," which was a well-considered essay on an important element of design. There was also one by Mr. REGINALD T. BLOMFIELD on "Drawing," which took a broad and masterly view of the art. The power of draughtsmanship exhibited of late by many a young architect was of such excellence that it ill became an old fogey to criticise it, and yet he would venture to emphasise what Mr. BLOMFIELD had advocated. It would be well to consider before beginning a drawing what the qualities and impressions were that they wished to perpetuate and convey to paper, never to draw a stroke which had not a definite purpose in view, and to avoid all conscious tricks and mannerisms. He would not discourage the delineation of cast shadows and reflected lights, for in them much of what was most delightful in the aspect of an architectural work depended ; but the shadows should be as flat as possible, and the reflected lights as tender. The scratchy, unrestful style adopted by some who were otherwise masters of pen and pencil delineation, was in his opinion much to be deprecated, and a return to the brush would be desirable if such blemishes could not otherwise be avoided. It would be well also if students spent some of their energies in studying cloud forms and vegetable growths, as many an excellent architectural drawing was ruined by the introduction of clouds and trees which often marred otherwise attractive work.

*Arts and Crafts.*—The "Arts and Crafts" were still holding their annual exhibitions in the New Gallery, and doing the work which he could not but think ought to have been done by the Royal Academy of Arts ; and still would be done by that Academy if it took a wider view of its mission, and gave itself

to the hearty encouragement of all branches of art, instead of mainly oil-painting, with scanty patronage of water-colour art, sculpture, and architecture, so far as the last could be illustrated by the pencil and brush. Its winter exhibitions of "Old Masters" had been of great value, but the supply of masterpieces belonging to those generous enough to lend them must in time become exhausted. He was, therefore, personally not without some hope that the future might find the Royal Academy inclined to look with favour on a winter exhibition which would embrace Art in all its forms, and which would do more for the nation generally than a mere exhibition of pictures was likely to do. Meanwhile, the younger members of the profession, whose time and talents might not be fully occupied in the pursuit of architecture proper, should devote themselves to the design of such things as were to be found in the Arts and Crafts Exhibitions; and such things, to be successful, must be designed on sound principles, for the observance of which the architect's training rendered him peculiarly apt.

*The Library.*—It should be borne in mind that the prosperity of the Institute as a corporate body was not exclusively dependent upon the exertions of its members alone; it could not afford to dispense with the goodwill of outsiders indirectly connected with the objects for which the Institute had been founded. The list of donations made to the Library in the course of the past Session sufficed to show that it possessed many friends and supporters whose names were not included in the Register of subscribing members, but who were nevertheless helpers in the good cause, and in the good work the members had at heart; and some conspicuous presents had also been received from members.

*A French Architect on English Work.*—One of the donors to the Library, Monsieur LUCIEN MAGNE, had recently written a criticism of the British architectural drawings exhibited last year in Paris. Monsieur MAGNE thought that their works were distinguished by their quality of picturesque composition, but they lacked, he said, that original note which was the result of the proper appropriation of details and profiles to the desired effects of light and shade. Modern English architecture was of particular interest to their French *confrères*, in that it did not appear to be the expression of conventional teaching; but, on the contrary, a manifestation of particular wants. In the irregularity of plan, in the determination to give to each part of the façade a form resulting from the destination of each room within, Monsieur MAGNE saw a reminiscence of the traditions of their art in the Middle Ages and the early Renaissance. He then went on to compare the design for the Imperial Institute



with the majority of the compositions of the Pensionnaires-de-Rome, and said that in it Mr. COLLCUTT displayed a liberty and boldness in his disposition of masses, an elegance in treating the silhouette of his building, which were not often to be found in the contemporary work of French architects. Such praise, coming from such a pen, was, of course, very gratifying to them, and it contained a note of warning against the dangers attendant on any established teaching of architecture, not as a science, but as an art. The PRESIDENT hoped they might carefully lay to heart the true lesson which Monsieur MAGNE in so many generous words would instil—not to lose freedom and liberty in design by reviving the formulas of an architectural education conducted everywhere on the same lines; but he did not think there was at present any danger of that. The exercise of liberty grew with what it fed on, indeed it seemed to tend in many cases to licence; and there were modern buildings in England which displayed in their details a recklessness of what thoughtful men, with ordinary reasoning powers, considered appropriate.

*Contemporary Works.*—Speaking generally, he could not help noticing a curious tendency in the work of some of the most esteemed of his contemporaries: the introduction in the same building of parts avowedly made to look as if designed by different people in different ages. One rightly appreciated the charm given to many old buildings by the work of successive generations. The craze for the destruction of everything not of the original period of a building's history in its restoration had now happily passed away, and they were zealous to preserve the history written in the stones of buildings as they found it, if there was no imperative reason for its removal. But surely that was a different thing from constructing fictitious history. If they could not help being eclectic in some sort, ought they not at least to try to produce a harmony in their work, and leave it for others who should come after them to introduce other styles and modes of detail? The tendency of work in England at present was unquestionably towards smallness of parts: they strove for the picturesque rather than for grandeur, and lost much thereby. As an instance of a reaction against that tendency, the PRESIDENT spoke of Mr. SEDDING'S Sloane Street Church, with its two fine campanili, its magnificent windows, and its nave wider than that of St. Paul's Cathedral—in fact, to the unusual aspect of breadth and space which had been imparted to the structural parts of that fine work. Another instance of the dignity begotten of a broad and simple treatment, in the hands of a master like Mr. NORMAN SHAW, was the new central home of the Metropolitan Police. It was a building which forced itself on the attention,

and gave pleasure in no ordinary way, however much the critics might think they could improve it in a detail here and there. The PRESIDENT also congratulated Mr. PEARSON on the magnificent effect of the new front to the north transept of Westminster Abbey. Though nearly line for line what had been there before, the impression produced by the new front was very different from the effect of the old one it replaced. That difference arose not merely from the newness of the stone, but from a certain artistic piquancy and thirteenth-century flavour about it which the poor, pared-down, sadly mutilated old skin had not possessed.

*Westminster Abbey*—The Royal Commission on Westminster Abbey, convened to consider the capacity of that building for further monuments to the most illustrious of Her Majesty's subjects, had not yet reported progress; but he would mention, as the enquiry had been a public one, that though there was still room in the Abbey for some eighty interments, there seemed to be no more space for monuments without doing still further injury to it in the future than had been done so ruthlessly in the past. The objection to the removal or rearrangement of any of the monuments, however destructive to the general appearance of the interior of the Abbey, or revolting to the taste of the day, seemed insuperable in the present state of public opinion; and under those circumstances various schemes for erecting a memorial chapel within the precincts of the Abbey had been laid before the Commission, and duly considered. They would shortly be reported upon. Unanimity, however, on such a subject was not to be expected; all that could be hoped for was to lay before Parliament and the public some scheme which would secure a fitting place of sepulture and memorial for illustrious fellow-countrymen—of sufficient space and dignity for the proper display of sculptured monuments, and at the same time so intimately connected with the Abbey itself as to partake of its prestige and worthily continue its traditions as the last resting-place of those amongst them held most in honour.

*British Art Gallery*.—It must have been a matter of congratulation to every art-loving Englishman that, through the generosity of Mr. TATE in presenting his splendid collection of pictures by their countrymen, under certain conditions, to the nation, they were at length to have the nucleus of a gallery devoted exclusively to the British school of painters and sculptors. It was true that those works would be at present poorly housed architecturally, though those best fitted to judge considered the galleries at South Kensington excellent as to light. It was to be hoped that in the near future some other munificent benefactor might arise; and, by building them a fitting shrine,



associate his name with that of Mr. TATE \* and the masterpieces of British art, as the name of Mr. ALEXANDER would be for ever associated with the National Portrait Gallery, by what he was so generously doing for the nation under the able guidance of Mr. EWAN CHRISTIAN.

*St. Paul's Cathedral.*—As President, he had been invited to say something about the painted decoration of St. Paul's. If he previously had hesitated to do this, it was chiefly because he did not know enough about the intentions of those who had charge of the work. The painting of the stonework near the reredos was at present obviously incomplete, and so it was impossible to judge of its ultimate effect; but few had shown themselves better fitted, by what they had done elsewhere, than Messrs. BODLEY and GARNER to advise in such a question. It was certain that Sir CHRISTOPHER WREN had painted in oil paint the walls of the nave and nave-aisles, and therefore some might say there was authority for painting them again. It would hardly be questioned, however, that one of his motives for doing so had been to avoid a worse evil—the disintegration of some of the stonework of the interior from damp. That, at any rate, seemed to have been the case at the west end of the cathedral; in the choir, Mr. WATERHOUSE was informed that distemper had been used, which seemed to indicate that, paint having been resorted to in part of the building, it had been found necessary to bring the rest of the fabric into harmony with the painted part. When the cathedral was warmed with hot water, the coating of paint was no longer necessary as a preservative, and so it was removed, and the colour wash removed with it. The stone had now a charming variety of tone, heightened in places by the white mortar in its pointing; and it was a very grave question whether any painted decoration as satisfying as, or approaching in dignity and solemnity to, that now existing in the warm and varied tones of the masonry—smoke-begrimed and dingy though it was—would ever be obtained. Whatever might be thought of its sculpture, mounted on a red marble background, and relieved by partial gilding, the Reredos appeared to him in its architectural portions to be a work worthy of its surroundings; but he confessed he was very jealous of its being treated as the keynote for the whole cathedral in point of colour, and he was inclined to question the advisability of any scheme of decoration which, in order to secure harmony throughout the whole building, involved the re-painting of the walls generally. If such renovation were determined upon, where was it to stop? Could it stop short

\* Since this Address was delivered Mr. Tate has himself made an offer to the Government to erect such a building at his own expense.

of the western doorways? He was bound to admit, however, that the great architect of the building had suggested such a treatment by what he himself did in its eastern extremity; though he perhaps there had allowed himself, in the obscurity of the apse, a strength and contrast of colour which he might have felt would have destroyed the unity of the interior if carried down the choir and nave. On the other hand, were the plasterer's work in the vaulting relieved with gilding, the effect might be very charming, and without injury to the harmony of the interior.

*The Use of Faience.*—The increasing attention paid to the use of faience for internal decoration was a matter of much importance in their unfortunately dirty atmosphere. It enabled the architect to insure that his more important apartments should remain as he designed them. Most of them who had had long experience as practising architects must have been occasionally disconcerted in discovering that some interior which depended greatly on its harmony of colour, and which they might have thought more or less a success when it left their hands, had been handed over when in need of repainting to the tender mercies of some decorator, who, failing to appreciate the delicate scheme of colour upon which the architects had prided themselves, or perhaps wishing to make his speciality more pronounced at the expense of the architecture of the room, had sown discord and vulgarity broadcast over their creation. Now, the use of faience would put a stop to all that. If well applied—the forms specially designed, the colours, too, carefully studied, and violent contrasts avoided—faience offered to the architect a new and most interesting field for permanent decoration. It seemed almost impossible to be too careful in the juxtaposition of varied tints, as they looked, of course, much more violent in the building than when put side by side in the workshop.

*Architects not members of the Institute.*—It was a matter of sincere regret that a few of their most distinguished brother architects who were not members of their Body looked upon the Institute with apparent indifference and distrust. That certain names were not to be found in the Register of Fellows was a grief to him. He could not, of course, say that they would confer any benefits upon themselves by joining, except the benefit that all must derive from united action for a good and worthy object. The members of the Institute were bound together by certain ties; but only such as made the profession of architecture respected by the public. They had no unworthy aims, and did not want to shackle any man's right liberty of action. The PRESIDENT longed to see the time when all who had any pretension to



the name of architect, and who were willing to conform to the obligations deemed essential to uphold the honour of that noble profession, would feel it incumbent upon them to join the Institute; and help the members to become better artists, more scientific constructors, more thorough men of business. The advancement of their art was not best attained, it seemed to MR. WATERHOUSE, by every man working in isolated retirement, and there could be no doubt that the occasional sight of each other, in meetings such as theirs, was productive of the kindly generous feeling with which each should regard the other.

The dignity, the greatness of their profession arose from its responsibilities; and in that it differed from all other artistic vocations. The painter had only to please himself in the subject, the inception, and execution of his work. If, when finished, it was a thoroughly successful work, in all likelihood it would find a purchaser. The architect, on the other hand, could find nothing to do, could give no satisfactory proof of his capacity, until somebody came to him who was willing to trust him. Not only was he intrusted with the expenditure of large sums of money, but of money expended in such a way as to affect the comfort, the happiness, often the whole tone of the existence, of those who employed him. The client who employed a worthless, incompetent architect not merely threw his money away; he had to endure a far heavier misfortune: he had to live the rest of his days in a house, or worship in a church, or conduct his business in an office or a bank, which he would willingly erase from the face of the earth if he saw his way to such a termination to his disappointment. But practically his annoyance could not so be put an end to. If the building he had commissioned were ugly, ill-contrived, and badly executed, so it must remain—a constant source of trouble to himself, of derision to his friends and the public. Architects had, therefore, to show themselves worthy in every way to be trusted. They had to be sympathetic, not leading their clients into unexpected expenditure, not, on the other hand, following their whims if technical knowledge and experience told them plainly that such a course would lead to disappointment: for what would be thought of the physician who suffered his patient to dictate the nature and strength of the remedies to be prescribed? The architect, therefore, had to be not only an artist and a skilled constructor, but he had to learn to appreciate the value of other people's money; he had to be considerate, honest, patient, firm; and, above all, he had in imagination to put himself in the place of the employer, so as to understand his wishes, and give them practical artistic shape.

THE PRESENTATION OF PRIZES took place on Monday, 19th January 1891, when the PRESIDENT delivered to the assembled students and others an Address the theme of which was the Proper Treatment of Colour in Architectural Design.\* Mr. WATERHOUSE pointed out that the recent most generous augmentation of the Studentship dealing with that subject afforded a special occasion for attention to that sometimes neglected branch of their work. Though addressing himself primarily to the younger among the company, he felt that his remarks would be heard by several who might well feel it hard to listen to a discourse from one who in so many ways ought to be their disciple rather than their instructor, and to them he would say that he did not wish in the least to dogmatise in a matter so eminently one of personal taste. He would merely express some of his views as arrived at by experience, and proposed, in subdivision of the subject, to speak first of external colouring, and next of internal decoration as applied both to pavements and to walls, with a special reference in the latter case to the use of glazed tiling or faience.

Until very lately, the modern school of architects had given little or no attention to colour. Drab was the genteel hue. Venetian red or yellow ochre had to be tolerated rather than enjoyed when they descended to brickwork. Lately those ideas had been revolutionised. RUSKIN, with a pen which fired the imagination with descriptions of colour-harmonies more bewitching than those which emanated from many a painter's brush, had set their minds aflame for colour. Other influences in the same direction had also been at work, but the result was not always what could be desired. Two reasons might be assigned for that result: one, the national inaptitude for the task, the want of the true instinct for colour, which appeared to be infallible in the arrangement of dyed wools used in a Persian or an Indian carpet,—or, rather, which always had been so before the excruciatingly unpleasant aniline dyes had been forced upon the carpet-weavers of the East; another, the climate, which required far more attention and care to avoid colour-contrasts in violation of good taste than was needful in sunnier climes. The varied hues of a collection of ordinary Italian houses, which looked right enough, and were, in fact, charming, under an Italian sky, would not be tolerated in England. The fact was that bright sunshine was a great colour-harmoniser, and as they were not blessed with too much of it in England, they needed to

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\* The Address, in its entirety, is printed in *The R.I.B.A. Journal*, Vol. VII., pp. 121-26.



be the more careful in combinations and contrasts of colour. Effects of colour which had delighted them in Southern latitudes had been noted and reproduced at home with but an indifferent result, one reason for which was that one could not reckon on the sun putting a glaze upon chromatic crudities. Then, again, though they must reckon without the sun, they could not reckon, at any rate in towns, without the smoke which enveloped them with ever-increasing density; and which, after fires were over and Spring came round once more, was found to have left its dirty finger-marks on those portions of buildings which were most susceptible to its influence. That presented another difficulty to the chromatic artist. However skilfully he might have arranged his colours, and however satisfied he might have been with the effect produced thereby when the building left his hands—still, if the material which furnished one colour were more susceptible to smoke as a blackening agent than that or those which furnished others, the colour effect was changed, and, possibly, not improved.

The only material that he knew of which was absolutely improved by smoke, especially if the style employed were columnar, was Portland stone. It was a happy thing for London that its use had been so common, for it and soot seemed made for each other, and were sure to marry happily. Harmonies in black and white, however, could hardly be called great achievements in colour. It was not to be supposed that they would not strive after other well-assorted unions, only in all cases soot must be looked upon as a most undesirable but certain factor whose alliance they had to do their best to defeat. The union of brick and stone, and of stones of different densities, and of bricks of different hardness, presented these difficulties: the stone and the soft bricks got black, and the hard bricks retained their colour more or less in proportion to their density. Glazed tiles in combination with stone were of course quite inadmissible for the above reason, and even polished granite combined with freestone was of doubtful expediency. Emery-polished granite, which secured for the material all its colour, without that reflecting surface which marred its repose and prevented its happy union with the surrounding stonework, was to his mind, when granite was to be employed, by far the best suited for exterior effect. Highly reflecting surfaces killed form, and so did colour-contrasts to a certain extent. They might conclude to prefer a colour effect to the distinct discernment of form, and do so rightly in certain cases, but they should always know when they were sacrificing form to colour: it must be done from choice and not by accident; and when changes of colour were introduced into forms which were studied, and in-

tended to produce a definite effect, the disturbing effect of the colour should always be taken into consideration.

It was a most interesting question how far the application of pigments on the buildings of antiquity enhanced their beauty. Judging, for instance, from some of the learned polychromatic restorations by the holders of the French *Grand Prix de Rome*, he preferred Greek temples in their present aspect to their effect when bedizened with their pristine splendour of colour; but perhaps, after all, the student with all his research might have been mistaken, not as to the use of polychromy (that could not be doubted), but as to its exact application. On the other hand, there were fragments of Greek buildings bearing original colour, as for instance certain bits in the Museum at Palermo, which gave one nothing but delight. Again, one was tempted to feel that the mediæval art, which happily still survived in England and France, could not have been always improved by the colour with which it had been frequently overloaded. He preferred its present aspect; but it must not be forgotten that time had been busily at work not only in the effacement of the original pigments, but in treating the work with a colour-decoration of its own by accident and by weather-stains.

Former ages, even the most refined, had been not only tolerant of excess of colour, but delighted in it in a way which would be repellent to the present peculiar phase of civilisation. If they compared the sobriety of colour which characterised the works of the present generation of painters with those of the artists who flourished before RAPHAEL, they would see what he meant. He did not assert that all colour must be abandoned in this critical age, but that it had to be used with reserve and judgment if it was to find acceptance with the phase of cultivated taste peculiar to the present day. Violent contrasts should perhaps be avoided, and most certainly discordant ones. There were two strong contrasts which always affected one agreeably: the black and white marble of the Italian Gothic churches—as those of Genoa and Siena—and the yellow and red of Verona and its neighbouring cities. But what they called white was now yellow, and the colours which looked well in San Zenone were not so satisfactory upon a chapel in Paddington or Bayswater. Scientific workers in clay were now able, out of the same clay, to get two or more different colours on the same block. It was done by increasing the proportions of some of the natural constituents of the clay affecting the colour (the iron and the alkalies), by the addition of soluble forms of either element. These additions could be localised by limiting the evaporation of the soluble elements to certain spaces. Colours so obtained would, there



was every reason to expect, invariably harmonise with each other. Perhaps in this way, in developing the resources of the clays, and in the blocks of terra-cotta made from them, they might aim, with the aid of science, at subtle and agreeable changes of colour, securing a surface so dense as to be proof against atmospheric destruction and disfigurement; and at the same time avoid reflecting surfaces, which, if periodically washed, would disturb the eye by their glitter. It appeared to him that this was the direction in which the external colour-decoration of city architecture would be likely to develop satisfactorily.

The PRESIDENT was hardly able to explain what it was within him which objected to marble statues against a stone front; it was more than the mere incompatibility of the two materials, which when new never agreed, and which, when the stone had attained its full measure of sooty disfigurement, caused the statues to look almost ghastly in their cold obtrusiveness, serving only to teach them this lesson, that glaringly light objects destroyed the forms of the features against which they were set. Less offensive was the still objectionable practice of using a lighter coloured stone for statuary against the darker stone of the building. He had seen red Mansfield Woodhouse stone so used against ordinary dark red sandstone in a work which seemed, with this exception, of great merit; but such a contrast of colour in a work where no colour contrast was intended did something to destroy the unity of an otherwise admirable piece of work.

Turning to floors, he believed that of all the pavements the world had seen those composed of slabs of purple porphyry and green *serpentino*, surrounded and set in bands and interlacing circles of white marble, were the most satisfactory; smaller patterns of these three colours, almost always severely geometric, were interspersed in them to give interest and complexity to the whole and enhance the apparent dimensions of the larger pieces. Nothing of the kind that he knew of was equal to this *Opus Alexandrinum* in beauty and fascination, in the splendour and preciousness of the materials, and the depth and refinement of their colour, of a contrast just strong enough to bring out each other's attractions, and yet not destroy the harmony of the whole pavement. No doubt the stains of the softer white marble which age had brought with it made some of the floors of the earliest Italian churches and Basilicas even more lovely now than when they left the lapidary's workshop. There was one well-known example at home in the shrine of the Confessor in Westminster Abbey; but such sumptuous pavements could now be only rarely indulged in. The introduction of other marbles and other colours was nearly

certain to lower the character of the pavement ; but perhaps the most harmless admission to this matchless combination of purple, green, and white was *giallo antico*, as one element in the smaller geometric patterns.

The manufacture of tiles for pavements had been almost ruined by the folly of their makers in pandering to the undeveloped taste of a public delighting in gaudy and inharmonious colouring, so that cultivated people shuddered at the very mention of them ; but it was hardly necessary to say that there was nothing in tiles, the manufacture of which had now been brought in England to very great perfection, which would not lend itself to very beautiful arrangements of colour both for floors and walls, if architects gave themselves the trouble to study the effect of the tiles themselves upon each other before their final selection. No coloured drawing could with safety be relied upon. This precaution, of course, was as necessary for wall tiles as for those used in pavements.

In place of tiles the revived *opus incertum* of the Romans had lately come much into vogue. The beauty of these pavements of small marble tesserae principally arose from the softness imparted to them by the slight variation of colour in the so-called white marble. Black and "Sicilian" marbles were the kinds ordinarily employed, and none were more effective, with perhaps central panels of some dark red limestone tesserae, where depth of colour was desired. The principal objection to the employment of this *opus incertum* was the softness of the "Sicilian" white or grey marble, which consequently wore down much more quickly than the black or red ; so that a pavement which he knew and which was subjected to much traffic had had to be renewed in less than twenty years. A floor of tile tesserae, on the contrary, was very permanent, but was much harder in tone than one of marble. This could, perhaps, be overcome if the manufacturers would give twenty different shades of ivory and pearl to use for the so-called white spaces instead of a uniform snow-white, and if their reds and blacks also were supplied in similar variety. He believed then that the actual prejudice against pavements of ceramic tesserae would speedily disappear, and that arrangements of this very permanent material could be combined at comparatively slight cost which would satisfy a fastidious taste. Glass tesserae were open to the same objections as those made of tiles, but were also capable of the same judicious treatment. Some very fine combinations of blue and grey were already to be seen. The advantage of greys of various tones in place of pure white might be seen in any bit of *Gris de Flandres* pottery. Cover the greys of half such a pot with a coating of Chinese white, and the value of the grey would soon



become apparent; or even look at the sky: its blue, when interfered with at all, was, in broad daylight, interfered with not by *white* clouds, but by vapour of infinite variety of form, of varying quality and intensity of grey, sometimes so warm as to approach orange, and sometimes as cold as pure indigo, but always grey as compared with the blue vault in which the clouds sail.

The PRESIDENT reserved for the close of his remarks on colour as a vehicle of architectural expression what he had to say on the use of faience in such connection. He had alluded to this subject in his Address at the opening of the Session, because he could not help thinking that the architect ought to impress his building permanently with his own ideas as to its becoming colour, just as he did as to its appropriate form, and there was no way of doing this so satisfactorily as by the use of faience, certainly internally, and it might be in certain cases in towns externally also. He said in towns, because he supposed they would never wish to use in a pure atmosphere a material on which nature, as time went on, could not leave here and there her delicate pencilling. It would be foreign to his present subject to enlarge on the dangers to be guarded against in the use of faience; of the necessity for the greatest care, where it was not structural, that the backing should be of quick-setting cement, so as not to allow of undue absorption by the brick-work of the wall behind before it had time to set; and also on the necessity for grooving or roughing the backs of the tiles themselves to secure thorough adherence to the rendering. What he would insist upon as connected with the theme—for he was one who had been taught by bitter experience—was never to trust to a mere drawing in the colour combinations, but always to insist on seeing the faience blocks and tiles themselves in juxtaposition, remembering, however, that arrangements of colour which appeared perfect in single pieces, would really be far too strong when in a mass upon the walls. That was the hardest lesson to learn; he had not learnt it yet in practice, but he had observed that the treatment of some small room whose modest dimensions had demanded the very faintest contrasts of tint and tone, had, in consequence of this treatment, given him much more satisfaction than the arrangement of colours in larger apartments where a more ambitious combination of colour had been attempted. The actual scheme of colour in each case must be left to their own good taste and imagination, avoiding absolute white—unless it might be very small quantities—and strong contrasts, as destroying breadth, repose, and scale. His own predilections were for pearly greys and drabs inclining to ivory, red or green with very small points of delicate turquoise blue; but, as he had said before, he would not dogmatise in any way.

Nor would he take up time with saying anything about what might be done with different woods in joinery, and cabinet-work, and in the way of tarsia-work in each of these; except to remind them that there had been several examples of the latter work at the last Exhibition of Arts and Crafts, some of the most ambitious, in his humble judgment, sadly overloaded with ornament. That showed, in his opinion, the advantage of the architect's direction in such work. An architect might not design an arabesque panel better than, or perhaps as well as, an artist who devoted his life to such work; but he might know, and generally did know, where to stop. It was infinitely better to have too little ornament, if that little were but the outcome of one's best thought, than too much. In the Embroidery room of the same Exhibition Mr. WATERHOUSE had been struck with the same thought.

He could not close his remarks without a final word on the subject of glass. Windows were made to admit light, and, where there was anything of a pleasure-giving character outside, to see through. When these two objects were sufficiently attained they were better off with an 18-inch brick wall between them and the heat or cold of the exterior than with more glass. When windows were not wanted to be seen through they might be filled with glass more or less coloured. Now there was another pitfall: clients sighed, it might be, for something which they called cheerful—that was, glass of glaring colour—and if the architect were not made of sterner stuff than he had sometimes found himself composed of, they would have it at his hands, or get it elsewhere. Whereas, if they only knew beforehand what would really satisfy them, they would have been glad of something more approaching in colour an opal or a pearl. Of all the stained glass with which the churches of this country had been flooded within the last half-century, there was not one bit in a hundred that could not, in his opinion, be very easily spared. In the majority the drawing was bad, the sentiment mawkish, while the colour, which was the real excuse for shutting out the cheerful light of day, was the worst thing about these stained-glass windows; and yet there they were for all time, unless conflagrations, or a revolution conducted by iconoclasts, intervened to get rid of them. The old glass could ill be spared; but, with some few rare exceptions, it was different as regarded that which had succeeded to its place of honour.

Of the work of the Decorative Painter, of subject-pictures on walls or ceilings, in fresco or spirit medium, and of mosaic pictures, he would say nothing because time was too short. He contented himself by recommending those who had not yet been to Sicily, and who had a desire to prepare themselves



for service in the direction of colour decoration, to visit Palermo and Monreale, where the most splendid and at the same time the most refined interiors that he supposed there was any knowledge of could be seen. The Saracen work under Norman guidance glowed with colour like the rainbow, but there the similarity ceased, for it was as permanent as the latter was evanescent. Tall slabs of *Cipollino* clothed the lower parts of the walls for about fifteen feet with an ever-changing embroidery of greenish grey; then came a horizontal band of white marble with inlay of glass mosaic in the form of pines, or in geometric patterns, like those on the tomb of the Confessor. The same bands surrounded the doorways. Above all this, on walls, vaults, arches, and window recesses, there was nothing but glorious mosaic representation, generally on gold ground, every angle rounded to carry that splendid material.

One could not hope to repeat such glories except on very rare occasions, and on a small scale, but they formed one of the architectural sights of the world. Let it suffice for them to bring a delicate sense of refinement to their work, and give their best thought to the application of colour as they already did to the design of plastic work. In that direction they had a chance of their handiwork being somewhat original, as they might go to nature for colour motives to a greater extent than they could for forms. An afternoon at a Museum among shells and birds need not be thrown away upon the student of colour. He would there find many subtle harmonies that had never been attempted in human work; he would thus draw his inspiration from the highest source, and adorn the surface of his architecture with colour combinations never before attempted for such a purpose.

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LXXVII.

SASSANIAN ARCHITECTURE.

By R. PHENÉ SPIERS, F.S.A., *Member of Council.*

Mr. Alfred Waterhouse, R.A., *President*, in the Chair.

MR. PRESIDENT AND GENTLEMEN,—

THE completion this year of two books of importance, both of them adding to the somewhat scanty knowledge which we possess of the architectural works of the Sassanian dynasty, has suggested to me that the subject of Sassanian Architecture might be one of some interest to the members of the Institute. The books to which I refer are *L'Art antique de la Perse*,\* by Monsieur Dieulafoy (the discoverer of the enamelled treasures from Susa, now in the Louvre), and Messieurs Perrot and Chipiez's last volume,† which deals, amongst other styles, with the Persian, and refers to Sassanian work.

Although the Sassanian dynasty lasted only a little over 400 years (A.D. 226-641), and throughout its duration was perpetually at war with neighbouring and with foreign countries, its builders succeeded in developing a style which possesses certain marked characteristics, interesting from a constructional point of view. It has, however, other claims on our attention, as it seems to me to form a connecting-link between Assyrian and Babylonian architecture on the one hand, and Byzantine work on the other. It has a retrospective value as regards one, and a prospective value as regards the other: retrospective if we look upon the vaults of Al Hadhr, Serbistan, and Firouzabad, as the traditional method of covering over space, handed down from Assyrian times; prospective as regards Byzantine work, if the dates given to Serbistan and Firouzabad are correct. But I propose to defer the controversial ground which these latter questions involve. It will probably be sufficient now if I attempt to lay

\* *L'Art antique de la Perse: Achéménides, Parthes, Sassanides*, par Marcel Dieulafoy. *Cinquième partie: Monuments Parthes et Sassanides*. Large 4o. Paris, no date.

† *Histoire de l'Art dans l'Antiquité, &c.*, par Georges Perrot et Charles Chipiez. Tome v. *Perse &c.* Large 8o. Paris, 1890.

before you all that is known of the buildings which are said to constitute the Sassanian style. The principal building monarchs, with the dates of their works, may be roughly given as follows :—

- A.D. 226–242.—Artaxerxes, or Ardashir, founds dynasty, after having overthrown the Parthian monarchy, which had endured from B.C. 250.  
 242–273.—Shahpoor, or Sapor, I. takes the Emperor Valerian prisoner.  
 308–380.—Sapor II., or Sapor the Great, builds Serbistan.  
 458–482.—Peroses (Firouz) builds Firouzabad.  
 531–579.—Khosru, or Khosroes, I. builds Ctesiphon.  
 590–628.—Khosru II. builds Mashita and Rabbath-Ammon.  
 632–641.—Yezdegerd III., who died in 651, ten years after his defeat.

The earliest building classed as Sassanian by Fergusson is that of the Palace of Hatra, now known as Al Hadhr. Although only about thirty miles distant from Mosul, there seems always to have been considerable difficulty in visiting the place, owing to the hostile tribes infesting the country around. Respecting it little more has been ascertained than that which was communicated to the Institute in 1846, in a Paper by Mr. (now Sir) Henry Layard, which is printed on pages 63–68, and appears for the first time in our TRANSACTIONS. There are also accounts of the ruins, by the late Dr. Ross and Mr. W. F. Ainsworth, in the ninth and eleventh volumes of *The Journal of the Royal Geographical Society*. I have prepared a Map [Illustn. i] on which are shown the principal countries occupied by the Sassanians, and the more important cities of the Assyrian, Babylonian, and Persian kingdoms.

The most interesting buildings in the city are those situated in an inner enclosure constituting the remains of the palace. These consist of three large halls and a number of smaller ones, all of which were vaulted; with this precaution—that, being placed side by side, their vaults serve as abutments one to the other, the outer wall at the north end being twice the thickness of the others. The palace itself is built in the brownish-grey limestone of the country, in regular courses, the stones being said to be closely fitted, which means, probably, with thin mortar-joints. Some doubt, however, seems to exist as to whether there is mortar or cement of any kind; in this respect, therefore, it differs from most of the Sassanian buildings known, in which the construction, as we shall see, is of the rudest possible kind, with thick joints of mortar.

Two of the great halls measure each about 100 × 50 ft., and the third about 75 × 60 ft.; their vaults have all fallen in, but in some of the smaller halls the vaults are perfect. They are described as semicircular; if so, they differ from the Sassanian vaults, which are usually elliptical, their doorways being invariably circular-headed. The elliptical or three-centre curve is the form which, at Serbistan and Firouzabad, the arched vaults always take; and it seems to have certain constructive advantages, to which I shall draw attention further on. Indeed, this form of arch in brick is one of the earliest known. The granaries behind the Ramesseum at Thebes, which, according to Mr. Flinders Petrie, are supposed to be of the time of Rameses II., are of precisely



the same elliptical form as those found in Persia, and were probably built without centering of any kind [fig. 1].

It may perhaps be worth while, even at the risk of a digression, to enter more closely into this subject. The great problem which the builders of old had to deal with was, not so much the difficulty of throwing vaults across spaces, as of constructing them either without centering, or with centres of a slight and temporary character, timber being scarce in the country and, consequently, of much value. In order to lessen the span of the arch in the vaults of Rameses's Granaries, the lower courses of brick are built in horizontal beds, each one slightly overhanging the one beneath. This virtually reduces the span from twelve to ten feet in this instance. In the construction of the upper portion of the vault the bricks are placed flatwise (the bricks being twelve by six

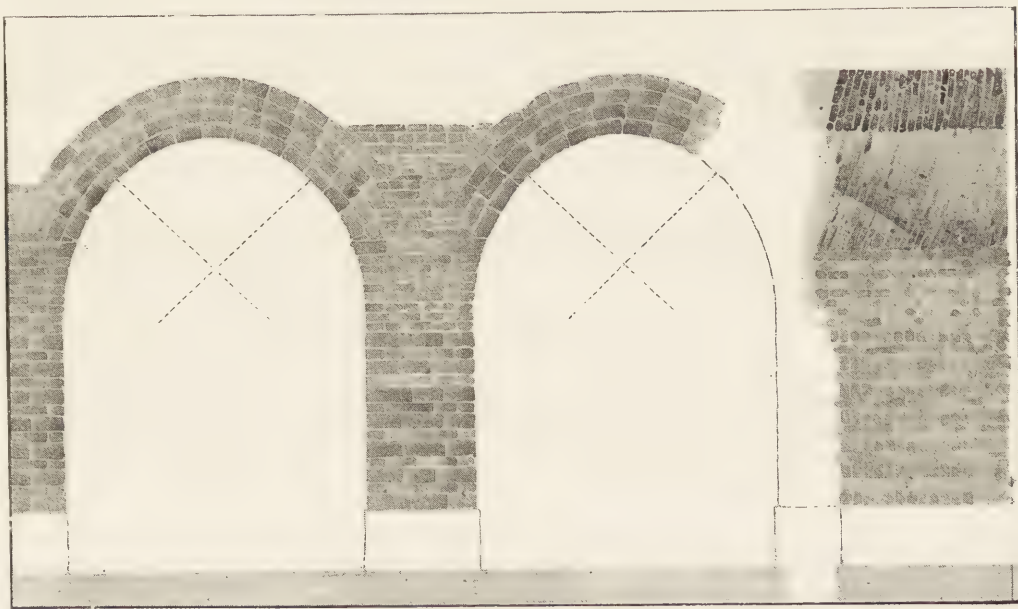


FIG. 1.—ELLIPTICAL ARCHES AT THEBES, EGYPT.

(From Lepsius, and from photographs.)

or seven inches, and three inches thick), instead of edgewise, so that in the vault—between the successive rings—there is no bond, each circular ring being independent of its neighbour, and from three to four inches thick only: the object being (as suggested by Monsieur de Choisy) to trust to the greater friction which would exist if the bricks were laid on flatwise, whilst each ring was being built, than if end-on, the customary practice with regular centres. In the case of stone voussoirs, or burnt brick, or tiles, this friction would be replaced by the tenacious character of the mortar; with crude bricks, the wetting of the surfaces with water would probably suffice. But, even then, it might be necessary to have some kind of temporary support, although it were given by a templet only, or by what Viollet-Le-Duc calls a *cerce*. The Egyptians, however, went beyond this, for, having erected the end wall, they built the first courses

of the arch in a slanting position at such an angle as would enable them to form a single ring without centering of any kind.

A similar method of construction seems to have been found by Sir Henry Layard in the large drains under the palace at Nimroud; and, so far as I have been able to discern in the palace of Ctesiphon, the rings also run in slightly inclined planes, and the bricks are generally, and notably in this great vault, placed flatwise.

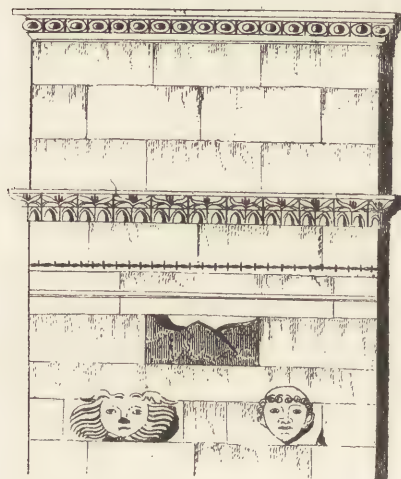


FIG. 2.—PILASTER AT AL HADHR.  
(From *The Journal of the Royal Geographical Society*, vol. xi. 1841.)

To return to my subject: the vaults of the great halls of Al Hadhr have all fallen in, and those in the smaller ones may have been simply covered with circular barrel-vaults. A photograph, however, of the interior of one of the great halls would show, looking at the back of the portal, whether the lower courses of the arch were built in horizontal courses; and also whether the curve above the springing had a greater radius than half the width of the hall.

The description given by Ross, in *The Journal of the Royal Geographical Society* [vol. ix. (1839) page 468], of the sculpture upon the voussoirs of the arched openings to the several halls [see *Illustn. iii*] tallies with that given by Mr. Ainsworth in the same *Journal* [vol. xi. (1841) page 13]. Referring to the most southerly hall, A, they say that on every one of the voussoirs of the arch leading into it, there was cut, in high relief on its external face, "a human bust"; and that some of these busts had very curious "curling bag-wigs."

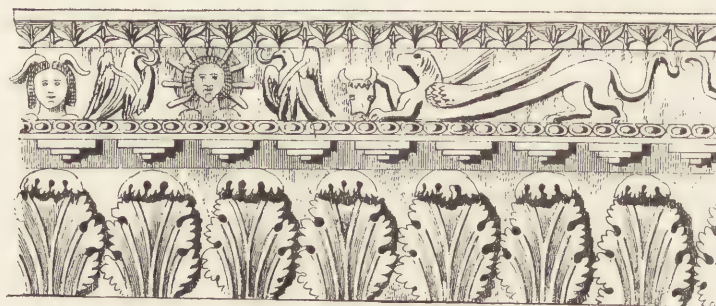


FIG. 3.—PORTION OF FRIEZE IN THE PRINCIPAL BUILDING AT AL HADHR.  
(From *The Journal of the Royal Geographical Society*, vol. xi. 1841.)

Referring to the second hall, from the south, and marked C [*Illustn. iii*], they say that the voussoirs which remained of the arch leading into it showed, outside, the figures of "angels or "females apparently "in the air, with feet "crossed and robes "flying loose." Again, in an old pen-and-ink sketch made at Mosul by Sir Henry Layard, features not unlike the angels referred to are shown on the voussoirs of the archways. But the elevation preserved in the Library, from which the diagram on *Illustn. iii* is reproduced, shows busts or heads on the voussoirs of every archway, and is probably incorrect.







Extracted from Johnston's Royal Atlas, 1877.

SKETCH MAP OF THE CO









Moreover, Mr. Ainsworth, describing hall C, states that, "In the interior on both sides of the hall, were three square pilasters surmounted by full round faces, 2 feet 2 inches high by 1 foot 8 or 10 inches broad, in high relief, and executed with considerable fidelity and spirit." Ross, referring to the same, states that "In each side of this hall are three square pilasters, and on each of these, near the crown, have been three full round faces—twelve of them are still in their places, and one much mutilated, lying on the ground, measured two feet from the tip of the chin to the top of the forehead. They have much the appearance of Greek or Roman execution. . . . Many of them have a binding round the head like a double fold of rope; and a hole cut in each eyeball gives them almost the look of life. Along each side of this hall is carved in high relief a fine cornice of round balls sunk into ornamental work; these from the ground seem about the size of twelve-pound cannon balls. The tops of the pilasters reach above the cornice, and are crowned with sculpture similar to it." Sir Henry Layard's description of these details will be found on page 67, and it was to him that both Ross and Mr. Ainsworth were indebted for their drawings. Referring to hall C, he states, "The ornaments over the arch differ from those at the entrance of the small chamber (B): two plain stones occur between each head or bust; the cornice has but one row of acanthus leaves, beneath which runs a spiral." In this hall, according to Sir Henry Layard, "the arch of the vault springs from the summit of these pilasters," above described. These pilasters are apparently about 10 feet wide [fig. 2], but how much they project is not decipherable, and whether they were spaced out at equal or irregular distances from each other is not clear. Curiously enough, they are carried above the main cornice of the hall and are capped by mouldings; and though Sir Henry Layard states that the vault springs from the summit of these pilasters, he makes no mention of a transverse rib which they might have carried, and without which they are devoid of meaning or purpose. I note this because Monsieur Dieulafoy (who has not visited Al Hadhr, and has no other authorities than we have) shows such a rib as I describe in the woodcut in his book; and he accepts Ross's irregular spacing of the pilasters. The possibility of the Palace owing its erection to Parthian, rather than to Sassanian, builders is suggested by Professor Rawlinson.\* Heads with curling bag-wigs, like those of Al Hadhr, are found on Parthian coins.

The town was besieged unsuccessfully by Trajan in A.D. 116, and it is recorded to have been then a walled town, containing a temple of the Sun celebrated for the value of its offerings. There can be little doubt but that the temple referred to is the square building at the back of the palace, for above the doorway which faces the east is a rich frieze [fig. 3], decorated in the centre with the head of the Sun-God, with doves, with crescents representing the moon, on each side; and, among other emblems, with winged griffins. In reference to this latter emblem, Mr. Loftus† states that at

\* *The Sixth Great Oriental Monarchy*, by George Rawlinson. 8o. Lond. 1873, p. 372.—R. P. S.

† *Travels and Researches in Chaldaea and Susiana, with an account of Excavations at Warka, the 'Erech' of Nimrod, &c.*, by William Kenneth Loftus. 8o. Lond. 1857, p. 225.—R. P. S.

Warka, the ancient Erech, about 250 miles south of Al Hadhr, he found amongst various objects, of which he gives drawings, a relief of a griffin precisely similar to the one in a frieze of the inner chamber at Al Hadhr—this being the frieze over the entrance doorway to the temple of the Sun. The ornament shown in these drawings of Mr. Loftus is of the same type as that shown in Sir Henry Layard's drawings, viz., Syrio-Greek, which distinguishes all Eastern work of this period. Amongst these remains were found quantities of Parthian coins, so that it may be fairly assumed that the palace of Al Hadhr was built by that dynasty. As regards its possible date, whilst the temple already existed in 116 A.D., the palace would seem to have been added afterwards, and may be

from seventy to eighty years later, or about 200 A.D. Fergusson places the date at 250 A.D., twenty-four years after the foundation of the Sassanian dynasty, to whose rulers he assigns its buildings. But, as will be seen when I come to the principal Sassanian buildings, their method of construction is so dissimilar, that it is impossible to suppose they owe their origin to the same people.

The next building mentioned by Fergusson is the so-called palace of Tigranes, at Diarbekr, now the mosque of that town, the date of which he places at A.D. 286-342; but, according to Professor Rawlinson, it did not come into the possession of the Sassanians until A.D. 359. The remains consist of the façades only of two palaces, the north and south facing one another at a distance of some 400 feet [fig. 4]. They seem to me to have been built up of materials taken from some more ancient palace, possibly that of Tigranes, an Armenian monarch, who, in B.C. 74, drove the Parthians temporarily out of Mesopotamia; and, though interesting for the exuberant richness of the carved shafts, capitals, and friezes, and the various peculiar forms of arched openings, they do not add much to the history of the

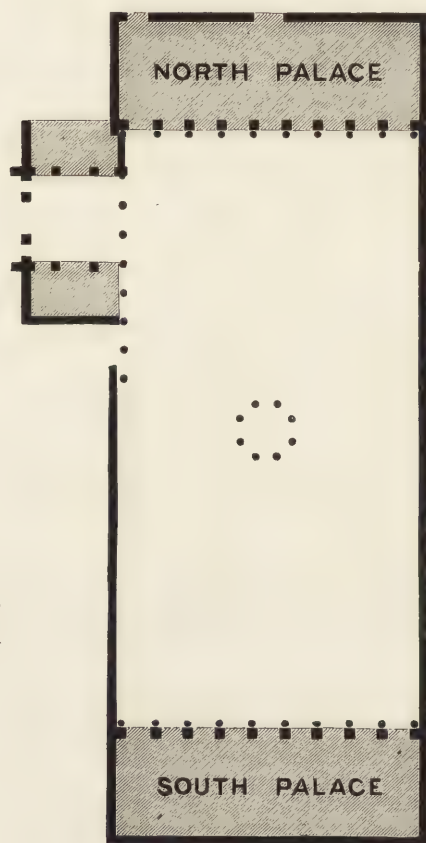


FIG. 4.—SKETCH-PLAN OF THE PALACE AT DIARBEKR.

Sassanian style. Cufic inscriptions run across the fronts, under the entablature. Here again the ornament which has been applied resembles that which Mr. Loftus found at Warka, and which is peculiar to the Parthian style [fig. 5].

The next example quoted by Fergusson is the first genuine Sassanian building, and is by him ascribed to a period when the Sassanian kingdom, by its victories, and by its alliances with neighbouring monarchies, had raised the old Persian kingdom to much



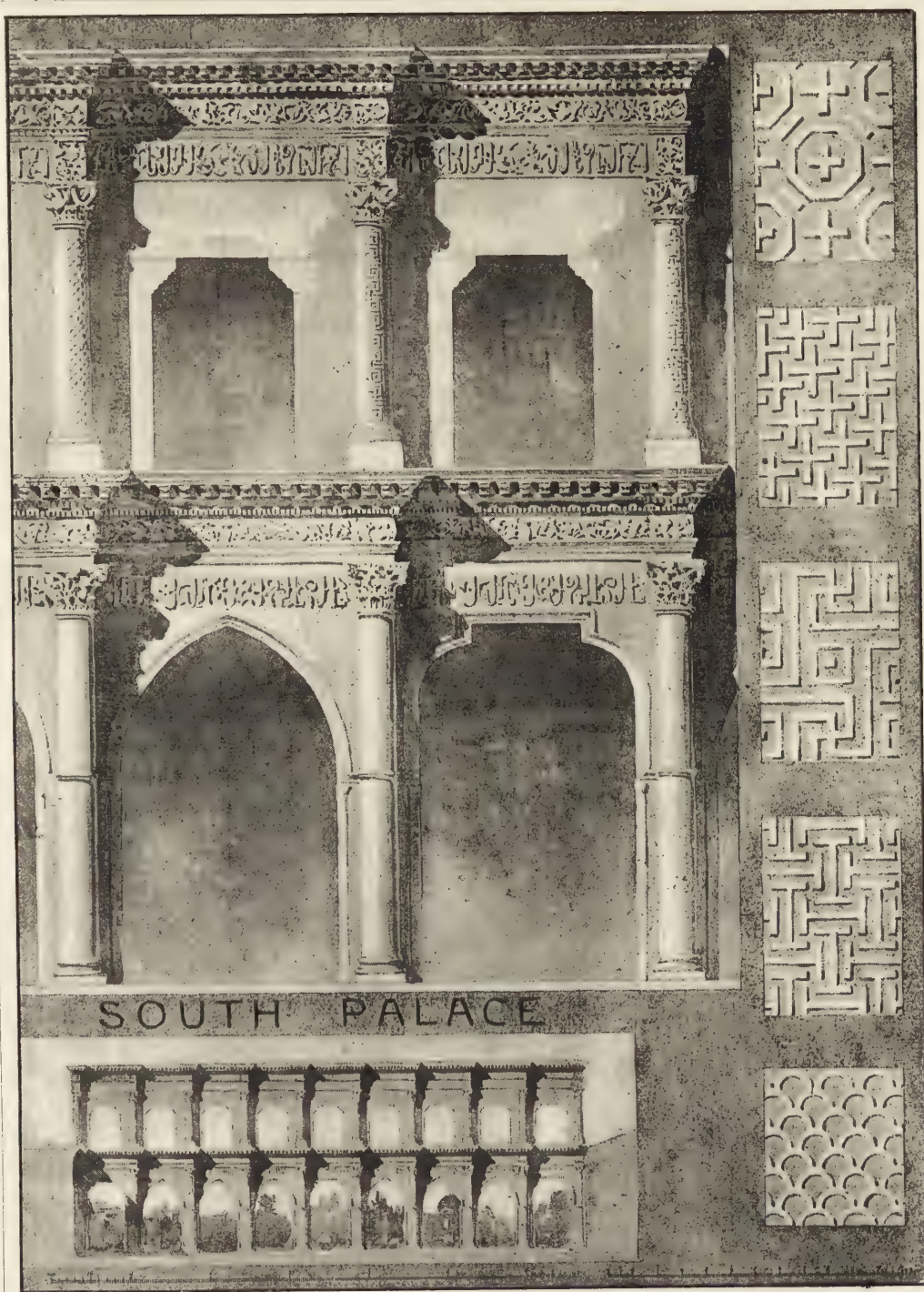


FIG. 5.—ELEVATION AND DETAILS OF THE PALACE AT DIARBEKR.  
(Reduced from a sepia drawing by Mr. R. Phené Spiers.)

of its former stability and power. The palace of Serbistan is assumed by Fergusson to belong to the age of Shapoor or Sapor, in the middle of the fourth century; its design and construction are, doubtless, the outcome of many trials and experiments, made in buildings no longer existing or not yet discovered.

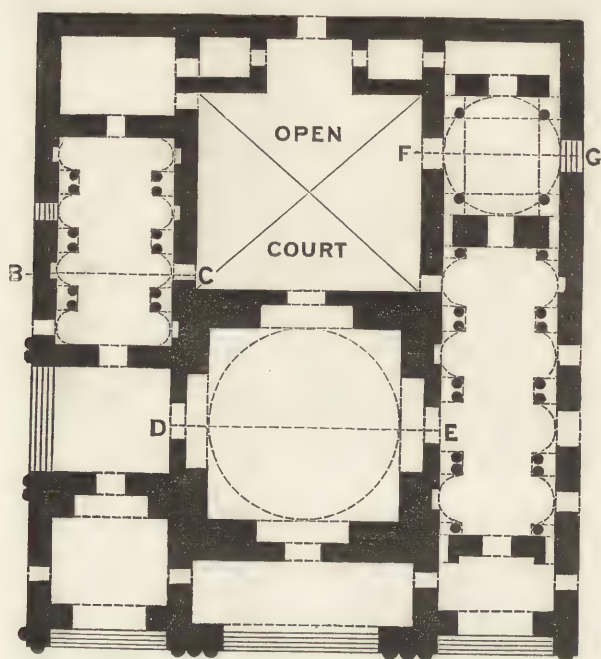


FIG. 6.—PLAN OF THE PALACE OF SERBISTAN.  
See fig. 7 for sections.

The stucco decorations which were probably applied to it externally and internally have disappeared, and we are left, therefore, only with the shell. This, however, is so remarkable for the scientific knowledge displayed in its construction, that it may be said to constitute an era in architectural style. The palace is of rectangular form, measuring about 120 ft. frontage by 140 ft. deep [fig. 6]. In the centre of the front, and again on the side elevation, are two porches, covered with elliptical barrel-vaults, both leading to the centre hall, which is covered with a dome on pendentives. In the rear of this centre hall is an open court, with a recess and smaller hall at the back, and on either side of the centre hall are two great halls with

recesses on each side. The halls are vaulted with elliptical barrel-vaults—the traces of which still exist on an end wall—and the recesses either with circular arches or with hemispherical domes [fig. 7]. The plan and sections are given in Flandin and Coste's *Voyage en Perse*,\* but with serious discrepancies in the method of construction shown, which suggests that they were not "plotted on the spot." The section (which has been reproduced in Fergusson)† shows (1) brick rims to the elliptical arches on the lower storey, (2) walls built in stone in regular courses, and (3) a series of six and seven concentric arches thrown across the angle and forming the pendentive. Madame Dieulafoy's photographs, however, give another version. The wall, up to the height of twenty-six feet, is built of irregular blocks of stone, buried in mortar; some of these blocks are exposed on the wall surface and on the soffit of the arch, which shows that the brick or stone rim of voussoirs shown in both never existed. All this was doubtless covered over with stucco and painted, or hidden by hangings. The regular courses of masonry begin above this, and then the pendentives begin. These pendentives do not consist, however, of a series of concentric

\* *Voyage en Perse . . . pendant les années 1840 et 1841.* Fo. Paris, 1851, Plates, vol. i. pl. 28, 29.

† *History of Architecture*, vol. i, p. 383, second edition, 1874.



arches built one over the other, as shown in Flandin and Coste's work. The lower courses run straight through to the angle; the upper ones are brought forward, but in so irregular and unscientific a way as to suggest that for their support reliance was placed on the tenacious qualities of the mortar. That which, however, would have

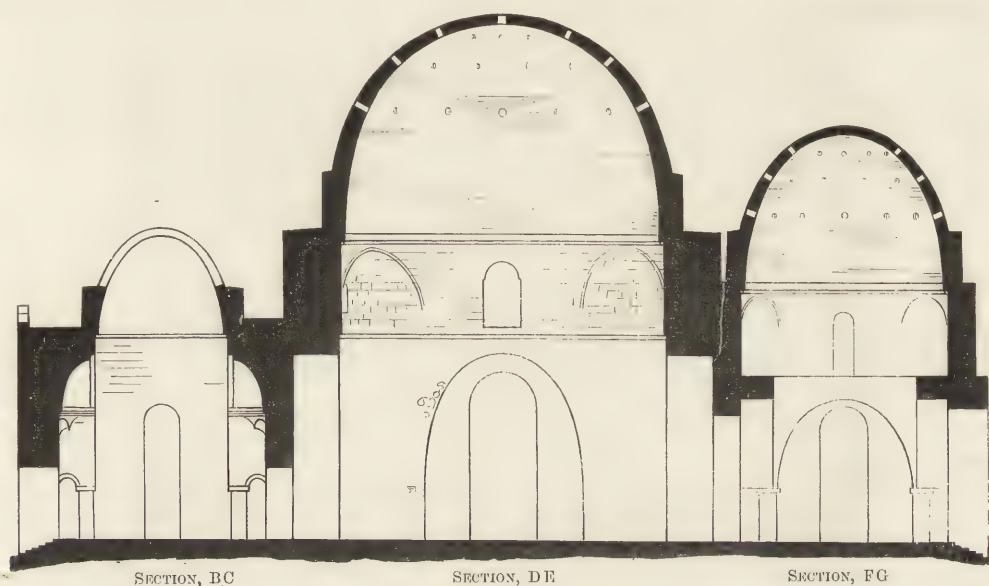


FIG. 7.—SECTIONS THROUGH THE PALACE OF SERBISTAN [see fig. 6].

formed the outer ring of the pendentives is wrought on the stone down almost to the springing, so that it would appear as if the Sassanians had seen regular arched pendentives of some kind, but did not know how to build them. This is the more remarkable because, as we shall see later on, they knew how to construct semi-domes over their recesses or niches, and in regular coursed masonry; if they had applied this to the angles, they would have invented the feature known as the squinch, a kind of pendentive employed in Romanesque work of the South of France [fig. 8]. The dome above is built in brick, and is of elliptical section—probably the traditional method of vaulting handed down from the Assyrian period, as may be seen from a bas-relief from Nimroud in the British Museum.

It is in the halls, which are about twenty-six feet wide, on either side that we find the greatest advance in scientific knowledge [fig. 9]. In order to lessen the thrust of the vault, and to avoid very thick walls, or the employment of buttresses outside, they built piers within the walls, forming a series of recesses or niches. These piers are not carried up to form transverse arches across the hall, but are spanned either by semi-domes, or, in two cases (where lofty doors exist to enter the main hall), by barrel-vaults; and these arches and niches come below the springing of the central elliptical vault, the width of which is thus reduced to about seventeen feet. Now, it is true these spans are not great, but the principle evolved is one which we should be more inclined to refer to French twelfth-century work; and it is remarkable that the

Sassanian builders should in this instance have recognised that, provided they obtained the requisite depth of wall behind the vault to resist its thrust, they might economise material or widen the halls by the use of internal piers. This, however, is not all; the lower portion of these piers is carried on columns, which give increased space: so that they had recognised the fact that, the thrust being resisted, the actual weight can

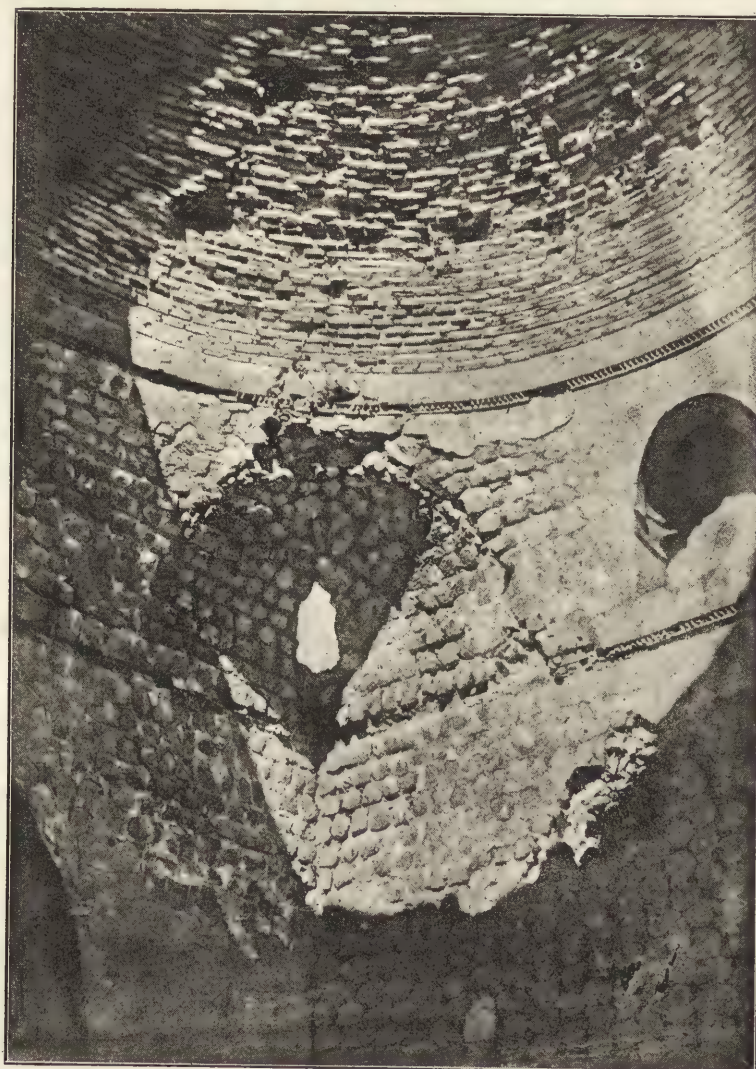


FIG. 8.—PENDENTIVE IN THE PALACE OF SERBISTAN.  
(From *L'Art antique de la Perse*, 4ième partie, Pl. V. 40. Paris, 1885.)

be borne by supports of less superficial area than the piers themselves. Semi-domes are found at Palmyra, Baalbec, and other places in Syria, and, possibly, further east, where they form the termination of semicircular niches. Here they crown rectangular recesses, so that a second arch has to be thrown across beneath, making in the angles an extremely pretty piece of design. In fact, were the columns replaced by loftier examples,



or the simple piers retained, this hall, if carried out on the scale of the great tepidarium of the Roman baths, would, by its play of line, constitute, in some respects,

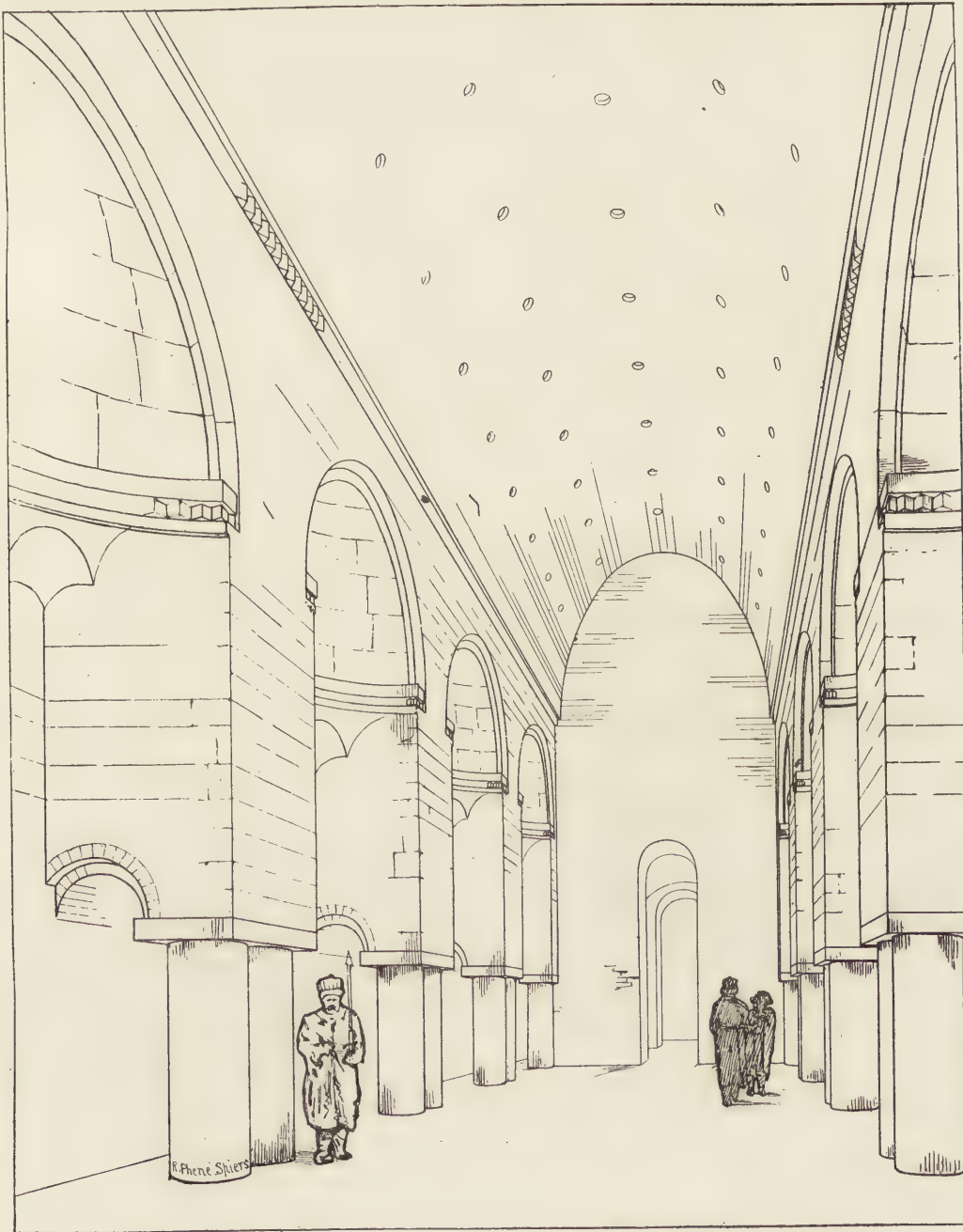


FIG. 9.—INTERIOR OF HALL, B C, IN THE PALACE OF SERBISTAN [figs. 5 and 6 ante].

(Restoration by Mr. R. Phené Spiers from Madame Dieulafoy's photographs.)

a more beautiful interior. It is, of course, just possible that these halls may have been built in imitation of the Roman halls, having been inspired by some Roman

captive. The decoration in stucco, with which it was probably completed, is gone; but there still remains one decorative moulding, of simple form, which may be looked upon as of Sassanian origin. It is, possibly, the source of that which is recognised as Norman dog-tooth ornament, for the bricks or stones under the fascia band are set edgewise; we shall, however, come to its employment again in a later building. These halls were lighted from the vault or dome through hollow terra-cotta pots, built in the thickness of the vault at regular intervals.

We come now to a second example, the Palace of Firouzabad [fig. 10], which is looked upon as the typical building of the style, and is one in which we find a

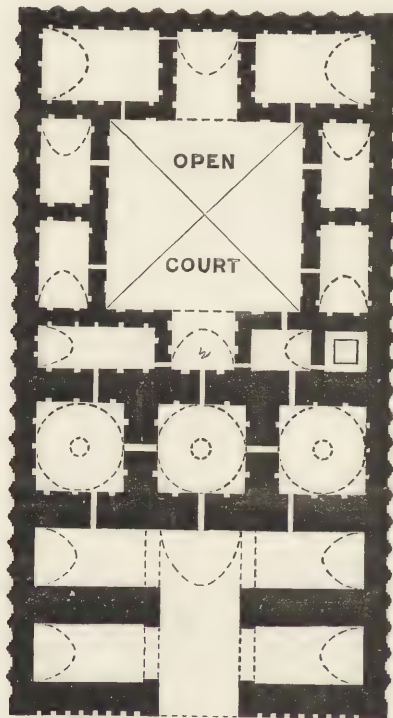


FIG. 10.—PLAN OF THE PALACE OF FIROUZABAD [Illustrn. ii].

recurrence to earlier forms of Persian architecture. Fergusson assigns the date of A.D. 450 to this. The Palace of Firouzabad has a frontage of about 170 feet, and a depth of about 320. The entrance consists of a hall about 90 feet in depth, and about 45 feet wide, covered with an elliptical barrel-vault. To the right and left are two other halls, also vaulted. Beyond this are three halls side by side, occupying the full width of the building, each vaulted with a dome on pendentives, consisting of a series of concentric arches, advancing one over the other [Illustrn. ii]. Here the haphazard method of Serbistan is discarded for a regular and definite method of construction. It is scarcely necessary to point out that, by this system of concentric arches, the Sassanian builder did away with centering altogether, each superimposed ring being carried back on the top of such ring beneath, and resting on it. In the rear of the building is an open court, surrounded with other apartments, all vaulted with elliptical barrel-vaults. That, however, which is most interesting in this palace is the stucco decoration, portions of which remain

in the small niches in the front and in all the principal halls, and in the external decoration of the side and rear walls. These latter, which are illustrated by Monsieur Dieulafoy, and which, in fact, recall the primitive method of decoration adopted by the Chaldaean builders, consist of reed-like pilasters of semicircular section with panelings between, with this important difference—that the arches which surmount them show for the first time the adoption of an arched form as a means of decoration. The cornice consists of a broad lintel or fillet, with bricks set edgewise below—the one decorative feature characteristic of Sassanian architecture. The great doorways inside are surmounted with decorative features which, in style, are borrowed from Persian palaces, but with some important differences. First, they are in stucco only, and







*From a Sepia drawing by R. P. H. S. S.*

PENDENTIVE IN THE PALACE OF FIROUZABAD

[Page 48.]





*From a Sepia drawing by H. Pharaon, 1925*

OPEN COURT IN THE PALACE OF RABBATH-AMMON.

[Page 59.]





are planted on the surface of the work, whereas in Persian work they were always in stone; secondly, an arch replaces constructively the stone lintel; and, thirdly, the cavetto cornice, instead of commencing with a vertical rise, spreads out—a clear proof of a much later and decadent form of composition. The junction in the centre also is clumsy, showing an imperfect knowledge of the features the builders were copying. The niches are imitations of the windows of a Persian palace, but are decorative only, and too shallow to serve any purpose.

Monsieur Dieulafoy, on his visit to the country, arrived at the conclusion that this was a Persian palace, built in the style of the country in the sixth century before Christ, the real Persian palaces (as at Persepolis and Susa) being the governmental style introduced from foreign nations. It is too long to enter into the question here, but the probability lies in favour of the ancient Persian palaces at Persepolis and Susa being a reproduction on a larger scale of the still older Elamite palaces, such as were found in the ancient city of Ecbatana—not, therefore, a foreign importation, as is inferred by Monsieur Dieulafoy, but with such foreign elements introduced in the great terraces on which the Persian palaces were built, and in the sculpture decoration, as would naturally follow when Babylonian artists were brought into Persia. Apart from this, however, the two methods of construction, the Persian and the Sassanian, are wholly and entirely different—first, the Persian architect sets great store by the careful and fine jointing of his stonework, as at Pasargadæ, where that material is employed; when he uses crude brick he covers over the surface with enamelled brick, or, as in the case of the Hall of Artaxerxes at Susa, with enamelled concrete blocks, whereas Sassanian joints are of the coarsest possible description, and their construction of arches (intended to be concealed under a plaster decoration) sometimes rivals that of the modern jerry-builder [Illustrn. ii, A], except that the mortar is excellent. Secondly, surfaces of enamelled bricks or concrete are always found on Persian palaces; but in no Sassanian building yet discovered, including Firouzabad, has a trace of this kind of work been found (except in some of the citadel walls at Susa, where it was embedded in the centre of the walls, having been taken from Persian palaces and used as a filling-in). Thirdly, the cementing medium used by the Persians was bitumen; that of the Sassanians was always lime—in fact, the latter followed very much on the lines of Roman construction, except that they occasionally used larger stones and coursed them with thicker joints; and in the interior walls of Serbistan, the stones are thrown in very much like pebbles or flints in ordinary concrete, to give greater cohesion to the mass. Lastly, the introduction of an arch below the lintel of the Persian doorway is too glaring an innovation to have existed at the same period as Persian trabeated construction.

It is on account of this characteristic method of building of the Sassanians that I am the more inclined to attribute the Palace of Al Hadhr to Parthian workmanship; the finely coursed masonry and thin joints there not being in accordance with the ordinary Sassanian method of building. In short, the style of this Palace of Firouzabad must be looked upon, in my opinion, as being a kind of renaissance of the Persian style.

I now come to a third palace, respecting the authorship of which there is no doubt. The Palace of Ctesiphon on the Tigris is known to have been built by Chosroes I., and Fergusson gives the date as about 550 A.D. If my argument in favour of Serbistan and Firouzabad being Sassanian buildings of the fourth and fifth centuries of our

era has failed to convince you, a comparison of the design and construction of this great palace at Ctesiphon, and others, will enable you to judge whether, in its design and construction, it is not the natural outcome of the development of the Sassanian style such as we might find a century later—in opposition to the theory of Monsieur Dieulafoy, who assigns them to the Achæmenidæ, the monarchs of the earlier Persian Empire, thus

giving their architects the credit of being the designers and constructors of two entirely different methods of construction, and of principles of design quite opposed one to the other.

The Palace of Ctesiphon on the Tigris is better known than any other Sassanian work, owing, probably, to its proximity to Baghdad, from which town it is distant about thirty miles. It forms a rectangular block, with a front 312 ft. wide, 105 to 110 ft. high, and a depth of 170 ft. [figs. 11 and 12]. In the centre is a magnificent portal,

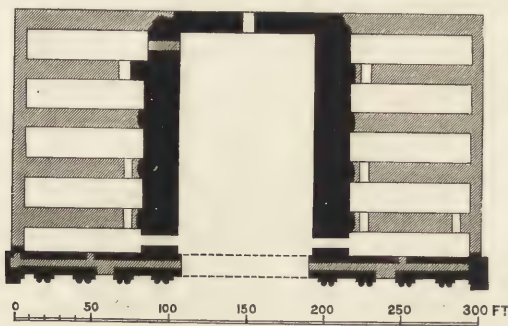


FIG. 11.—PLAN OF THE PALACE OF CTESIPHON.



FIG. 12.—SKETCH OF THE RUINS OF THE PALACE OF CTESIPHON.

rising the whole height of the front, giving access to a hall 163 ft. deep, vaulted with an elliptical barrel-vault 83 ft. wide and 95 ft. to the crown of arch. Fergusson remarks: "Instead of the plain circular arch of the earlier examples, the architect has "here attempted the section of one of his domes, hoping thus to avoid some, at least,



“of the lateral thrust—to obtain, in short, by an ellipse what the Gothic architects “managed by the pointed arch.” It is difficult to understand to what earlier example (except Al Hadhr) he is referring, because in the Palaces of Firouzabad and Serbistan, described by him, all the great vaults are elliptical. But the thrust exerted by a



FIG. 13.—REMAINS OF THE GREAT VAULT OF THE PALACE OF CTESIPHON.

(From *L'art antique de la Perse*, 5ième partie, Pl. VI. 40. Paris, no date.)

barrel-vault is so different from that of a dome, that it is scarcely likely the idea was taken from the latter. Besides, the Sassanian architect never saw the section of his domes: they were not drawn out on paper as with us. The elliptic form, as already shown, is one of the oldest known, and was adopted, probably, for two reasons: first, because the slightly sloping lines of the lower portion of an upright elliptical curve

enabled the building of the lower portion to be laid in horizontal courses; and secondly, it diminished the width of the span to be vaulted. By this method not only was an enormous centering saved by the lessening in width, but the thrust of the portion arched with voussoirs was thus brought well within the thickness of the side walls [fig. 13]. The real arched construction at Ctesiphon begins about sixty-seven feet from the ground, and the horizontal projecting courses of the lower part of the ellipse have, in fact, already diminished the width of the opening about one-sixth part of the whole—namely, from 83 ft. to 70 ft.

This is not, however, the only interesting lesson we learn from this great arch. The bricks or tiles with which the arch is built are laid flatwise, a method already described as existing in the granaries at Thebes. The tenacious quality of the mortar was probably almost sufficient of itself to hold each brick in its place till the ring of the arch was complete; at all events, the centering could be of the slightest construction, with small timbers, thus saving great expense. There is also that same inclination in the rings of brickwork to which I alluded when speaking of the granaries at Thebes [fig. 1]. It is just perceptible in the photographs. I communicated, however, with an English resident at Baghdad,\* who, in answer to my questions, states that the vertical layers of brick lean slightly backwards: Monsieur Dieulafoy in his section

\* Extracts from a letter written by A. B. Taylor, Esq., Baghdad, in answer to enquiries are here given (with a reproduction of the sketch he was good enough to send):—

I had no opportunity of answering with any accuracy till I could see the arch, and ascertain by examination the various points raised by you. I enclose a rough pen-and-ink sketch [fig. 14] of one wing of the arch, together with what remains standing of the arch itself (when the north wing of the arch fell some three years ago it did not affect the arch itself, but this last spring the whole front portion of the arch fell, leaving now only the back part of the vault). This sketch is very rough, and probably all out of perspective, but it will give you an idea, and serve as a basis for the lettering which is explained in the inclosed memorandum. The following memorandum answers all your questions regarding the arch, and I trust will be of use to you.

Total length of arch and both wings . . . . .	312 feet
Width of arch at base . . . . .	86 "
Height of arch to extreme top . . . . .	105 "
Length of hall . . . . .	163 "
Thickness of walls . . . . .	23½ "

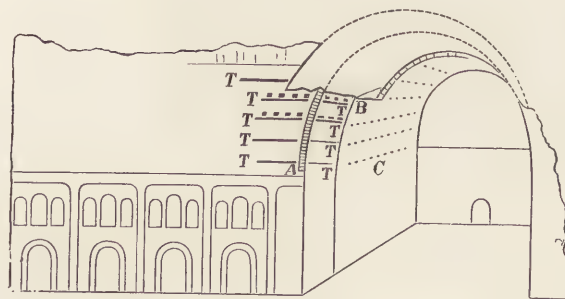


FIG. 14.—DIAGRAM OF THE RUINS ON CTESIPHON.  
Made on the spot in 1890.

away at the base is probably due to human depredations, more than to time and weather. Your supposition regarding the courses of bricks is correct. The bricks lie horizontally from A to B in the sketch, but they incline slightly to the centre as the arch overlaps. At the point B, where the vertical courses of bricks

The rough sketch shows the southern wing and the back part of arch, which is all that now remain standing [fig. 14]. The ties of wood (T) extend through the thickness of the wall of the wing—no further; above them the butt ends of beams resting on them are visible. The pot-holes through the roof of the arch appear to be vertical, but not quite so. They run through the top of the arch, as per sketch; but, as they are all blocked up, it is difficult to be certain of the direction. There are six rows of them on each side of the vault. The whole arch is built of burnt brick and cement, and the base appears to be of the same material as the top. The crumbling



shows, I think, too great an inclination. In the vault thus constructed a series of hollow pots have been built in, going through the whole thickness of the vaults, though now blocked up; they probably served some purpose, and there are various theories connected with them. Monsieur Dieulafoy contends that they were intended to light the hall, and that the portal was closed by a curtain: which seems unnatural, for they might just as well have built a wall to keep out the weather, if it was required. At one time I thought they might have been introduced to lighten the vault, as at San Vitale, Ravenna—but they are too few in number for that purpose; or, again, that they might have served as bond between the several rings of brickwork—but this would destroy the elasticity of each ring.

The conclusion I have come to is that they were used to pass down cords for the suspension of lamps, in the same way as we find in the Mosque of Sultan Hassan at Cairo; and this idea is strengthened by the assertion that when Ctesiphon was taken, in A.D. 637, a hundred silver lamps suspended from the ceiling formed part of the treasure there found.\*

In the main front, on each side of the portal, bond timber has been built in, to hold together the projecting horizontal courses. These bond timbers are carried through the thickness of wall, viz., twenty-three feet. In the front only are two rings of brickwork, which are carried below the horizontal courses down to the springing, or, in other words, to the level of the minor axis of the ellipse; these rings of brickwork exist only on the face, being carried back about six inches. It is probable that, for the formation of the front of this arch, a wall was built to serve as centering. The arch is formed of four rims of brickwork about 5 ft. deep; the bricks are placed flatwise, and above a deep rim of brickwork built in the usual way. Subsequent to the building of this arch the brickwork has been carved to form a kind of foil and cusp ornamentation; it is incorrectly shown in Coste's view,† and is there represented as if each foil was constructed with brick voussoirs, whereas the ornamentation and the construction have nothing to do with one another. The brick rings have been carved afterwards, and might have been cut with triangular forms, or circles, or any other shape [fig. 13 *ante*].

The decoration of the flanks of this great centre portal is of the most bewildering description. It contains, it seems to me, two elements—first, that arising from the reasoning faculty, which required that the front should be strong and capable of resisting the thrust of the vaults behind and the pressure of the strong winds which occasionally sweep the plain, and which have, at last, proved too much for it—for within the last four years the whole of the right-hand wall has been blown down, and last year

commence, there are seven layers of brick in thickness; but these decrease to four layers on the top of the arch. The vertical layers of brick lean slightly backwards. The arch is decidedly a pointed one, but the point is rounded off.—A. B. TAYLOR.

\* James Baillie Fraser, an author whose information is derived from various Oriental writers [*Mesopotamia and Assyria, from the Earliest Ages to the Present Time, &c.*, p. 156, 12mo. Edinburgh, 1842], states that the great hall at Ctesiphon "is plastered and perforated with holes, from whence tradition tells that in the "time of Khoosroo there hung a hundred silver lamps." The same method of lighting still exists in Indian Mosques, and in other Eastern buildings.—R. P. S.

† *Notes et Souvenirs de Voyage* (1817–1877). So. Paris, 1878, vol. i. p. 380.

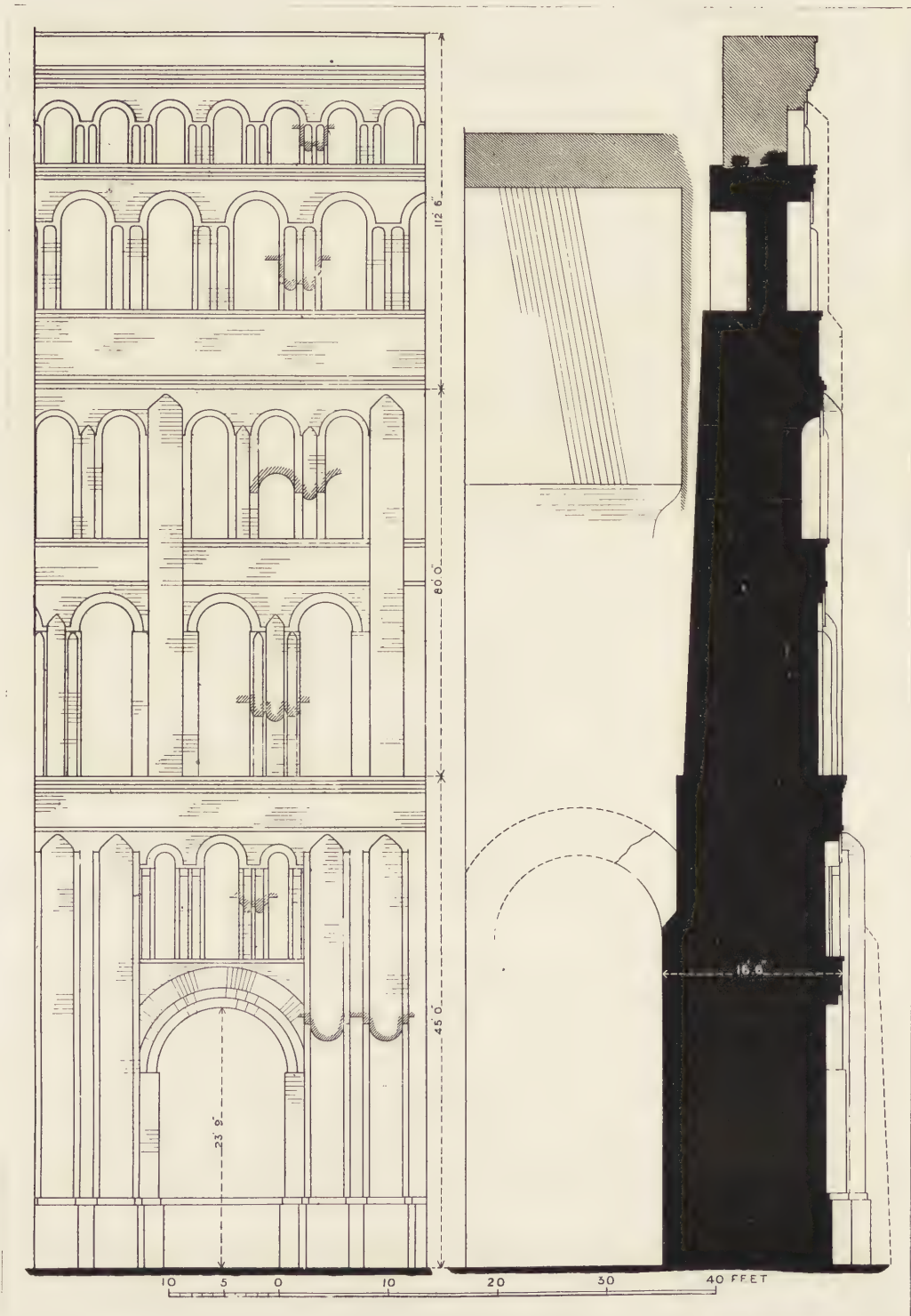


FIG. 15.—RESTORATION, BY MR. R. PHENÉ SPIERS, OF A PART OF THE FAÇADE OF THE PALACE OF CTESIPHON.



the front of the arch fell in; secondly, the imitative faculty, shown by the attempt, as it appears to me, to reproduce Roman features, such as are found in the various amphitheatres of the Empire—that is to say, the superimposition of columns with arcades between [fig. 15].

Now, the reasoning faculty is shown in the building of the wall, which is made thicker in the lower portion (behind which were vaulted chambers), and the employment of projecting shafts or semi-detached columns to serve as buttresses. These I have shown had already been adopted at Firouzabad; they are found also at Serbistan. These projecting shafts are delineated by Coste as being columns with capitals; but in the reproductions of Madame Dieulafoy's photographs I can detect no capitals,—only a cone-like termination. As a matter of fact, the capitals would have had nothing to carry, for what might be considered to be an architrave consists only of decorative bands on the plane of the wall, against which the shafts rest.

On the ground storey the shaft buttresses are coupled together, which is rarely, if ever, found in Roman work (here, however, I am open to correction); the Sassanian architect coupled them to obtain greater strength. There are four compartments on each side, and between each Coste has shown an arcade of two Orders—that is to say, two rings of masonry—the lower one set back behind the upper, which would be, if true, the earliest instances of their adoption. From a more careful examination of the photograph, however, I think the lower ring was faced with tiles, which have fallen out, as those of the great arch had before its fall, so that the faces of the upper and lower rings were flush. Above the arcades is a triple arcade, here apparently of two Orders. On the first storey the shafts rest on the projecting ledge of the thicker wall below; the Sassanian architect puts these shafts where he wants them most, which does not happen to be in the axis of the coupled columns below. This would have, doubtless, shocked Vitruvius, and have driven the architects of the Revival mad. Nowadays, in England, it might seem to be a natural course to take, showing a free treatment of Classic work [fig. 15].

I should have noted that the extreme angles of the building on both sides are flanked by huge buttresses, with a set-off like a Gothic buttress, and the end compartment on the ground storey, being narrower, encloses a smaller arch, double arcade above, and, between the two, another small arched niche.

On the first storey the four compartments are equal on each side, and there is a fifth on the side of the great arch, which is not flanked with a shaft or buttress, probably for the simple reason that, there being a wall behind, it was not wanted. In the compartments of the first storey are two arches, with a small buttress shaft between and above a triple arcade. The wall on the second storey is on the same plane as the first storey, but there are no buttress shafts, there being no ledge for them to rest on. On this second storey is a range of thirteen arcades, which run independently of the arches and shafts below; and, above these, a second range, also independent of those below, with three arches to two below. Nothing remains of the cornice now but the lintel and Sassanian zigzag already described. Although built in defiance of what are

now accepted as the principles of the Italian revival, the effect of the whole must have been of the most imposing character, and its existence down to the present day in a wild and unprotected country entitles the Sassanian architects to the tribute of our admiration, at least for their scientific attainments. As I have said, Fergusson attributes the erection of this palace to the age of Chosroes, about A.D. 550, the father of the Khosru or Chosroes II. who, in the succeeding century, subdued Palestine and destroyed the basilica of the Holy Sepulchre built by Constantine.

The remains of two other palaces have been found in Persia—one at Imumzade, which consists of a dome on arches, and a second, called the Tag-Eiran, which is new to us, having been discovered by Monsieur and Madame Dieulafoy, and published in their work. Tag-Eiran is probably a later example, for it shows a considerable advance in construction, and is lighted by clerestory windows between the huge barrel-vaults of the hall—these barrel-vaults being virtually a series of transverse arches spanning the hall. The interspaces, however, are vaulted across in so scientific a way as to suggest a constructional knowledge nine centuries in advance of their time. I am not quite sure of Monsieur Dieulafoy's restoration; it is partly contradicted by one of the photographs. The plan consisted of a central hall covered by a dome, and two wings; of the original building, one only of these wings and the springing of the transverse arches still remain, so that their real form, whether circular or elliptical, cannot be well determined. I have worked out the complete arch by projection from the photograph, and find it to be circular. I say the springing, but the lower courses are horizontal, on the same principle as in the arch at Ctesiphon.

I have now only two other Sassanian buildings to mention, and these are remarkable more for their decoration than for their construction. The Palace at Mashita and the Hall of Rabbath-Ammon, both in the Land of Moab, are supposed to have been erected by Chosroes II. during the subjugation of Palestine. They have this peculiarity: they were built for a Sassanian monarch by Syrio-Greek artists, who decorated them with ornament derived from Hebrew monuments, interspersed with Persian animals and Sassanian detail. The pot of manna, the vine leaves, and the grapes are Hebrew symbols; the animals are Persian; and the tooth ornament, the arches, and the shafts without capitals, are Sassanian. All these are interpreted by a Syrio-Greek artist in his own brilliant and characteristic manner to meet the requirements of a Sassanian monarch.

The Palace at Mashita was never terminated, and, beyond the general plan, I know little of its form, but the front of the lower portion of the enclosure wall is of unparalleled magnificence [figs. 16 and 17]. No further details of this palace have been published since Mr. Tristram's work on Moab, and the illustrations in his work are too small to allow of any judgment respecting the construction of the triapsal hall.\*

The Palace at Ammon [fig. 18] consists of a central court, square and open to the sky, with four deep recesses, one on each side; two are covered with barrel-vaults, the

\* *The Land of Moab: Travels and Discoveries on the east side of the Dead Sea and the Jordan, &c.* 80. Lond. 1873.





FIG. 16.—THE PALACE AT MASHITA, REDUCED FROM A SEPIA DRAWING BY MR. R. PHENÉ SPIERS.

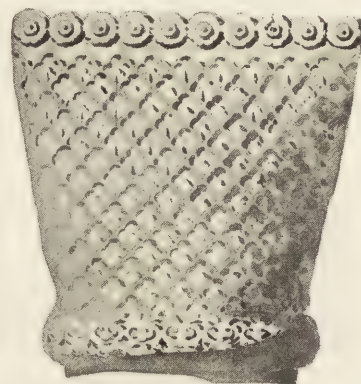
\* H



other two with hemispherical vaults on false pendentives—that is to say, the monarch wanted the feature, but the Syrian builder did not know how to build it, and he arrived



TAK-I-BOSTAN.



BI-SUTOUN.



TAK-I-BOSTAN.



BI-SUTOUN.

FIG. 17.—DETAILS OF SASSANIAN ORNAMENT, REDUCED FROM A SEPIA DRAWING BY MR. R. PHÉNÉ SPIERS.  
at the result in a haphazard manner—somewhat in the same way as we find at Serbistan. Monsieur Dieulafoy obtained his plan and section of Ammon from a French



Consul; the section,\* however, does not agree with the photograph taken by the Palestine Exploration Fund engineers. Major Conder, in his book entitled *Heth and Moab*,† states, "The arch is of peculiar shape, being very nearly semicircular, but having that 'same slightly elliptical form at the top which can be recognised in the arches of the 'Dome of the Rock at Jerusalem.'" The top of the arch does not appear in the photograph, but the curve shown seems to be of the same form as the three-centred elliptical arches found in all Sassanian buildings. [Illustrn. ii.]

With the exception of the Palace of Firouzabad, the ornamental decoration of which was adapted from Persian palaces, there are only two decorative details to be found in purely Sassanian buildings: the first being the zigzag moulding under the string, and which is formed by placing the stones or bricks edgewise; the second, the peculiar treatment of angle shafts to the arched openings, without either cap or base,

such as we find at Ctesiphon. Both of these are found at Rabbath-Ammon, but with an extension of the use of the zigzag ornament in its employment as a decoration of the arch. This is, in fact, a unique example of its use, and, although it may be purely accidental, it is curious to note how easily it might be mistaken for the Norman dog-tooth ornament. Whilst the introduction of these two decorative features at Rabbath-Ammon suggests that Chosroes brought over some of the artisans with him, both here and in Mashita he was evidently indebted to the Syrio-Greek artist for that elaborate wall-surface carving which is the chief characteristic of these two buildings. Except for the false pendentive, I should be inclined to think

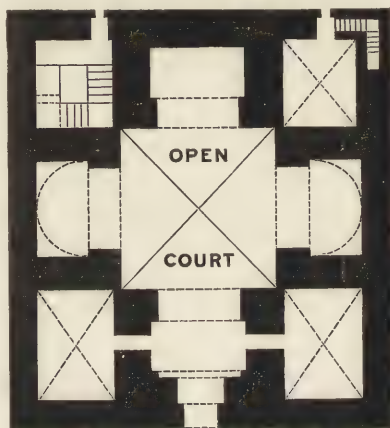


FIG. 18.—PLAN OF THE PALACE OF AMMON.  
[See Illustrn. ii.]

that the building at Rabbath-Ammon was designed by, and its execution carried out under, a Sassanian architect, with a few Sassanian masons; and that the work was handed over to Syrio-Greek artists to decorate. The way in which the ornament runs across the horizontal and vertical joints of the masonry shows, first, that it was carved after its erection; and, secondly, that, as is usual among Eastern nations, the artist set out his work on the wall as he went along. Very much the same method is adopted by Indian artists at the present day, who do not require drawings of ornamental detail to work from, and by the Egyptian potter when covering with ornament those pots and vases at Siout and Assouan which are probably well known to you.

The continual reproduction of the vine, with its leaves and bunches of grapes, shows that the artist had been previously employed in the decoration of Hebrew or Jewish buildings; and the type of ornament adopted elsewhere suggests that it is based on Greek scrolls and foliage, which, from the first century before Christ onwards,—in the

\* *L'Art antique de la Perse. Cinquième partie*, p. 99, fig. 84.

† *Palestine Exploration Fund—Heth and Moab*, by Claude Regnier Conder. 8o. Lond. 1885, p. 63.

tombs of the Kings and Prophets at Jerusalem, and in the buildings of Central Syria,—we may assume to be the work of colonies of Greek artists who migrated into Syria to escape the domination of the Romans in their own country. Later on, the descendants of these same artists became the early disciples of the school which, in the time of Justinian, produced those magnificent works in Constantinople, Thessalonica, Jerusalem, Damascus, and other Eastern cities.

How far the Sassanian architect, with his domes and pendentives, led to the Greek development of these features in the Byzantine style, it is difficult to say. There is no doubt in my mind that he derived them from the earlier buildings of Mesopotamia, and, therefore, possibly their retrospective value is of more importance than their prospective value. This theory, however, would lead me into a controversial enquiry, into which it would be premature to enter.

I have confined my attention to the purely architectural side of the question. It must not, however, be supposed that there are not works of the Sassanian dynasty in which sculpture forms the chief subject of interest. There is, I believe, only one instance of Sassanian sculpture in the round—a figure of Sapor I. carved in stone. Of bas-reliefs cut in the rock there are a considerable number, the style and execution of which show that the Sassanian sculptor followed on the lines of the Persian, who, in his turn, carried on the tradition of the Babylonian artist. The figures have not the vigour of the latter, or the refinement of the former, but in the ornamental details they carry on the development of certain features, so that in one case—for instance, the Tree of Life, such as we see represented in the earliest Chaldæan sculptures—the ornamentation passes through successive phases, until we recognise, I think, its influence in the pot of manna and vine of the Hebrews, and, later on, in the numerous sculptures in Venice brought over from various towns of Syria, and notably on the exterior of the apse of the church at Murano (parts of the decorative features of which are supposed to be of Syrian extraction). I may here note that the cornice of this same church possesses the Sassanian zigzag as already described, carried also round the hood-mould of the arch: this may, however, be purely accidental.

Flandin and Coste give several representations of Sassanian capitals,\* but what position they occupied and to what monuments they belonged is not said. There is one example, however, which comes from Tak-i-Bostan [fig. 17 *ante*]<sup>†</sup>—a recess with a semicircular barrel-vault; in this case, a bas-relief at the back is framed between two pilasters with capitals. The rock having been cut away, to allow of the relief of the figures, a cove has been left above them, and the capitals actually follow the curve,—a unique example of their treatment in this way,—suggesting that the Sassanian architect did not understand columnar architecture at all, but looked upon a capital only as a decorative termination to a projecting shaft.<sup>†</sup> There is a

\* *Voyage en Perse . . . pendant les années 1840 et 1841.* Fo. Paris, 1851, Plates, vol. i. 6, 17, 17 bis.

<sup>†</sup> *Ibid.* Plates, vol. i. 2, 3, 4, 6. Referring in the volume of *Texte* to Tak-i-Bostan, Flandin states that the sculpture possesses a distinctive character in its “grandes masses simples, dépourvues de modelé ou de “travail, opposées à des parties toutes chargées de détail, qui . . . semblent avoir été systématiquement



peculiar resemblance between the foliage of this cap and that of the Mosque of St. Sophia, both belonging to about the same period.

In conclusion, I may add that one of the results of my researches has been to throw considerable doubt on the correctness of all illustrations unless they are supported by the clearer evidence of photographs or photogravures. It is for you to judge by examination of reproductions of Madame Dieulafoy's photographs how far my strictures on Coste's work are correct. Curiously enough, Monsieur Dieulafoy in his own restorations is not always to be relied on, even with the photographs before him, and I should perhaps here note that I have confined my attention to the two last volumes of his work, dealing with what I consider to be Sassanian work. I have thought better to defer any consideration of his reproductions of the ancient Persian palace until he has given us some more definite information respecting his discoveries at Susa.

R. PHENÉ SPIERS.

#### NOTES ON THE FOREGOING PAPER.

By WILLIAM SIMPSON, R.I., *Hon. Associate.*

The geographical position of the Sassanian Empire gives its few remains an immense value, as they form the connecting-link between the architecture of Eastern and Western Asia. The high importance of these remains, from their bearing on the origin of domed and vaulted structures, seems to be admitted on all hands; and I may express my gratification with this Paper, seeing therein one sign, among many, that architectural students are tending more eastward in their search for light and knowledge. Geographical explorers have very nearly used up the earth's surface; but there are still large spaces left where our knowledge of the architecture is almost negative, or so slight that it is of no practical use in working out the history of particular forms or styles. We want men who have the time and the means to explore those large spaces for architectural remains. Young men go to the uttermost ends of the earth when it is known that some rare beast is to be killed, that they may bring home its head in triumph. It would not, I think, be too much to hope, that if some of them knew the value of successful exploration in this field, and the triumph that would accrue therefrom, they might be tempted into what I am sure they would find to be a species of hunting quite as exciting in its nature as that of chasing wild beasts. If the Institute could influence the teachers at our Universities to lead the thoughts of young men in this direction, I feel sure that we should soon have valuable results.

I believe I am expected to say something on the subject of the Paper, because I have travelled in Persia and Afghanistan; and I have recently learnt from Major the Hon. G. M. Talbot, R.E., who was on the Survey Department of the Afghan

"étudiées avec un soin minutieux, et qui se font d'ailleurs toujours remarquer par la pureté et l'adresse avec lesquelles elles sont exécutées."

Boundary Commission, and who made some long journeys in Afghanistan on the northern part of its frontier, that he has found, at a place called Haibak,\* not far from the ancient Balkh, some rock-cut caves which, although they are excavated, are copies of structural domes, and similar in shape to the Sassanian domes. There is one, a tall oval dome, the sectional outline of which [fig. 127, p. 257] is almost the same as that of the great arch in the Palace at Ctesiphon; and the pendentives are almost exactly the same as those in the Palace at Serbistan. I have no doubt that these caves were excavated as a Buddhist monastery; but, having nothing to guide one as to the date, one is left in the dark as to their priority, or otherwise, to the remains in the Mesopotamian Valley. These caves show, however, that the Sassanian style existed over a much wider space than the Mesopotamian Valley. Balkh is about 1,400 miles in a direct line east from the Tigris at Mosul; and we may suppose that domes at Balkh would not be very different from those at Samarkand and Bokhara. This space would include Parthia,—to which Mr. Phené Spiers has alluded more than once as a source of influence; and as Central Asia was at one time in a high state of civilisation, the origin of domes and vaults in architectural construction was as likely to have had its source there as in Mesopotamia. Ancient Parthia had not exactly the same boundaries as the present Khorassan, but the one may be roughly said to represent the other. An old Eastern proverb says that “Khorassan is the oyster-shell of the world, and Herat is its pearl.” Even in Mohammedan times it was said that “Science is a tree whose roots are in Mecca, but whose fruit ripens in Khorassan.” Poetry, art, architecture, and science were once in the most flourishing condition in Khorassan and the countries round it. Firdusie, the great poet of the Shah Namah, lived at Tus, a city that no longer exists: its site is near the present Meshed. Jami, another poet of high rank, lived and died at a spot which still bears his name, between Meshed and Herat. Omar Khayam, the poet and astronomer, whose works are warmly appreciated now both in our own country and in America, lived and died at Nishapur. These names themselves—and many more could be given—tell of the high cultivation that must have prevailed in Khorassan and Central Asia. It is quite possible that the art of the Sassanians came from that region. When the centre of the ruling power settled on the banks of the Tigris, it would be natural that architects and artists would follow from what then had become the provinces.

When in Persia I noticed that where villages were within reach of wood, it was used for roofs; but, if wood could not be found, vaulted roofs and domes were the rule. Now there is a large portion of Persia where there is no wood,† or at least it is scarce. Central Asia must have been in a similar condition; probably Seistan was the same. And when I realised how easily simple villagers could construct vaults and domes without centres, it appeared to me that, in all probability, such roofs had been used in these regions from a very early time. I confess at once that

\* See Mr. Simpson's Paper in this volume, pp. 258-266; also *Illustrn.* vi, pp. 260-261.

† Strabo mentions the want of wood in Persia:—“They are obliged to construct their houses narrow, “on account of the weight placed upon them, and from the want of long beams.” (Bk. xv. c. 3. 10.)—W. S.



this is not very exact or demonstrative evidence for the conclusion ; but it impressed my mind at the moment, and I see no reason yet, looking at it merely as a supposition, to reject the idea. The Euphrates Valley, I think, was also rather destitute of wood. Strabo mentions the scarcity of timber at Babylon,\* which may account for the vaulted roof being in use in that region ; and we may assume that, from Mesopotamia to the ancient Balkh and Samarkand, the vault and dome had existed from the earliest period of civilisation. From there it probably came to the Mediterranean and Italy. Professor G. Baldwin Brown, in his able Paper in the last volume of our TRANSACTIONS,† has been lucky enough to come upon a reference which tells that ancient Alexandria was built on vaults : and then there was also the Cloaca Maxima at Rome. The vault seems to have existed far more widely than we had previously realised ; it was a substructure, only waiting the necessity, or occasion, for making its appearance above ground as a superstructure. In the Far East, in the region dealt with by Mr. Phené Spiers, it had been a superstructure for ages past.

There is one detail I should like to allude to. If I understand rightly, the Paper says that in building vaults the bricks were placed in a particular way so as to derive some support from friction ; if this is correct, I may say that, in the domes and vaults now made in Persia, the bricks are placed in a sloping position, so as to rest partly on one another,—perhaps a little gypsum, which is plentiful in Persia, would be used,—and this, no doubt, helped largely to do without centres. In Messieurs Perrot and Chipiez's *Histoire de l'Art dans l'Antiquité (Assyrie)*,‡ there is a drawing of a tomb which represents the bricks in the manner I wish to describe them. The Paper also alludes to the use of pots in domes ; one would naturally suppose that lightness was the object. The Persians, in building a mud wall,§ make square hollow bricks, to which they give the term "Sanduk," which means a box, and these they place on the top courses for lightness. The pots in the dome seem to me to be only a variety of this method.

WILLIAM SIMPSON:

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NOTES ON THE RUINS OF THE PALACE OF AL HATHER (HADHR).

Communicated by the Rt. Hon. Sir HENRY LAYARD, G.C.B. (then Mr. LAYARD), in 1846.

[From a MS. preserved in the Library.]

The few remarks I have drawn up in explanation of the drawings will be sufficient to give you some idea of this building—the chief claim of which on your attention is its uniqueness : there is no other perfect monument of the same period in existence that I am aware of. The fine ruin below Baghdad, usually called the Arch at Ctesiphon [figs. 12–15 *ante*], is, as you no doubt know, but a portion of the original building. The Palace of Al Hather, however, as far as the ground plan is concerned, is entire. The edifice itself, too, is remarkably well preserved, and I have no doubt that a skilful architect would have little difficulty in restoring it, at least upon paper.

\* Strabo, xvi. c. 1. 5.

† Vol. VI. N.S. pp. 147, 148.

‡ Vol. ii. p. 232.

§ See TRANSACTIONS, Vol. III. N.S. pp. 57–80, for Mr. Simpson's Paper on *Mud Architecture*.

You will see a further account of the ruins in the 9th and 11th volumes of *The Journal of the Royal Geographical Society*, and that will make up for any deficiencies in the notes I now send you. But I must caution you against placing much confidence in the speculations as to the Chaldean and astronomical origin of the city. The remotest date one could assign to the buildings of which the ruins now remain would be the time of the Arsacian dynasty (founded 250 B.C.) or Parthian Kings of Persia, but I am pretty well convinced that they owe their foundation to the Sassanian (A.D. 226). I am obliged to make the plans, &c., on tracing paper, as I have no means of sending safely a more bulky material. I trust they will reach you in decent condition; one cannot, however, hope for much after the friction of two or three thousand miles.

Hatra, now called Al Hather (Al Hadhr), was probably founded, like Palmyra, as a station for caravans crossing the Desert by the great roads which connected Syria with Mesopotamia, Assyria, and Babylonia. The city must have risen to considerable importance at an early period, but its name is, I believe, first mentioned in history on the occasion of the effective resistance which it offered to the army of Trajan. Ammianus graphically describes it as *in media solitudine posita*, and calls it an ancient city. At the time of Jovian's retreat, A.D. 363, it was deserted, and the ruins which now exist appear to me to belong to edifices constructed after that period. It is probable that after the cession of the Provinces beyond the Tigris, after the treaty of Dara, by the Romans, the Persians saw the importance of Hatra, and rebuilt and strongly fortified the city. For, to whatever people it may have owed its foundation, I entertain little doubt as to the Sassanian origin of the Palace, fortifications, and principal buildings now standing. So little is known of the history of the place, that much cannot be added to the above remarks. It is described by most Arab geographers, who preserve the tradition of a memorable siege which it sustained under one of the Shapours, and which attributes its fall to an event which, however well suited to the genius of Eastern romance, would scarcely bear recital here.

By an inscription repeated more than once on the walls of the Palace, it appears that this building was restored by Azzuddin ibn Mesud ibn Maudud ibn Tamanki, Atabek of Trak, in the year of the Hejirah 586 (A.D. 1190). I am not acquainted with the period of its final desertion.

The ruins are now the occasional encamping place of the Arab tribe of Shammar. Their position renders a visit to them at most times hazardous; they were first reached by Dr. Ross, the surgeon of the British Residency at Baghdad, but this gentleman was compelled to leave them after a very hasty survey. He revisited them in May 1837, and remarks that "The ruins of Al Hadhr occupy a space of ground upwards of a mile in diameter, enclosed by a circular, or nearly circular, wall of *immense thickness*, with square bastions or towers at about every sixty paces, built of large square-cut stones. The upper portions of the curtains have in most places been thrown down, as have been also some of the bastions, but most of the latter may still be said to be in very fair preservation, each having towards the city vaulted chambers. Outside the wall is a broad and very deep ditch, now dry, and 100 or 150 paces beyond it is a thick rampart, now only a few feet high, going round the town; and at some distance beyond the fortifications stand two high mounds, with square towers upon them, one on the eastern side, the other on the north" [fig. 19].

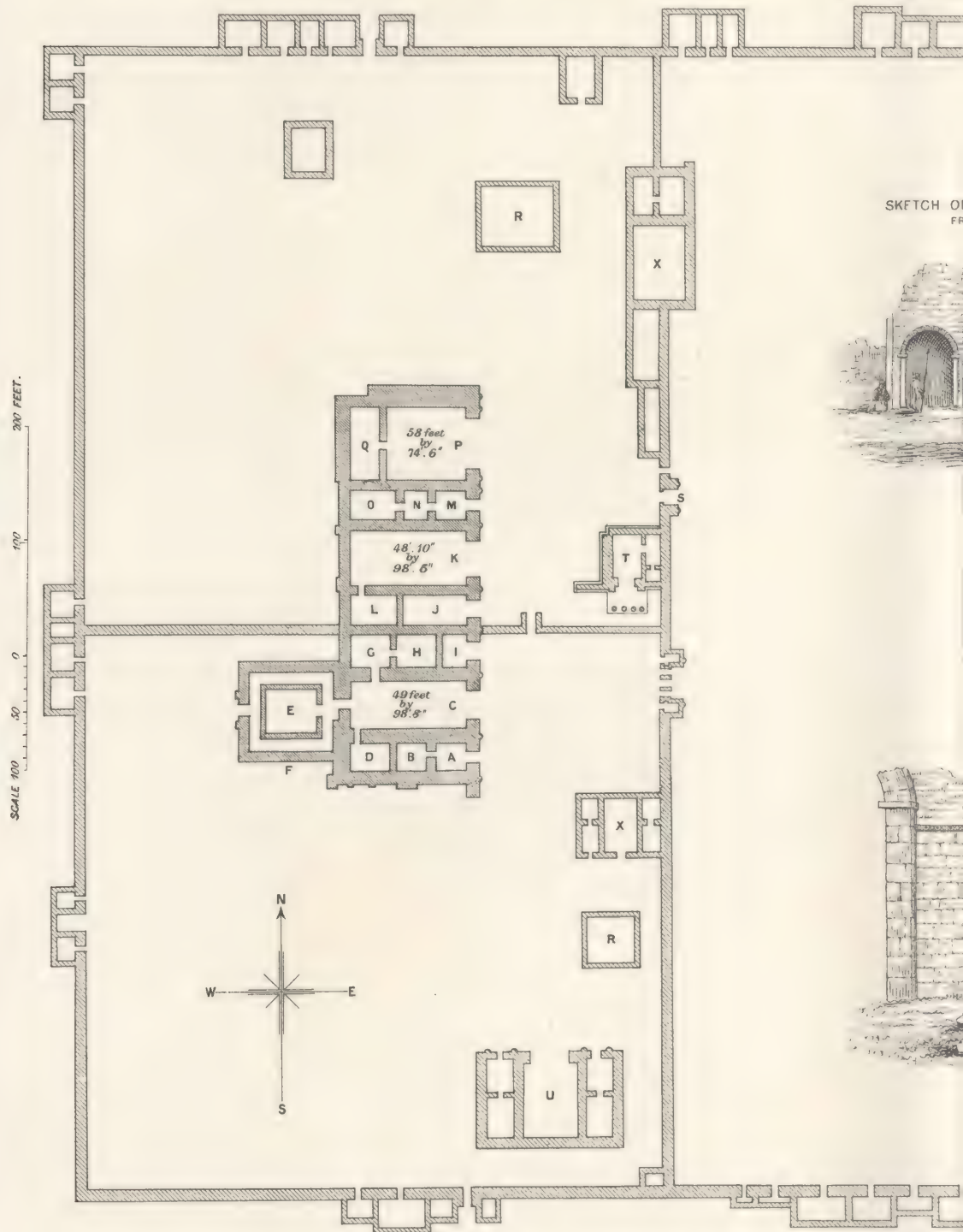
"In nearly the exact centre of the town stands the grand object of curiosity, whether temple or palace," observes Dr. Ross, "I shall not pretend to say, enclosed by a strong, thick, square wall (partly demolished), with bastions, similar to those of the city wall, fronting the four cardinal points, each face measuring 300 long paces inside. The square is, in its centre, intersected from north to south by a range of buildings greatly damaged, a confused mass of chambers, gateways, and one *built pillar* reduced to about thirty feet. Between this range and the eastern wall appears to have been a clear space. The principal buildings occupy the western pile and consist of a huge side fronting the east, and part of a wing fronting the north. The ground storey only remains perfect, and consists of a range of vaulted halls of two sizes.

"The whole city is built of a brownish-grey limestone, so closely fitted that if cement has been used it cannot be seen, and almost every stone in the great pile has cut upon it one or more letters or marks, seemingly the builders' number, as they are seen in the midst of broken walls, where they could not have been exposed when the structure was perfect." \*

\* *The Journal of the Royal Geographical Society*, vol. ix. 1839, pp. 467-470.

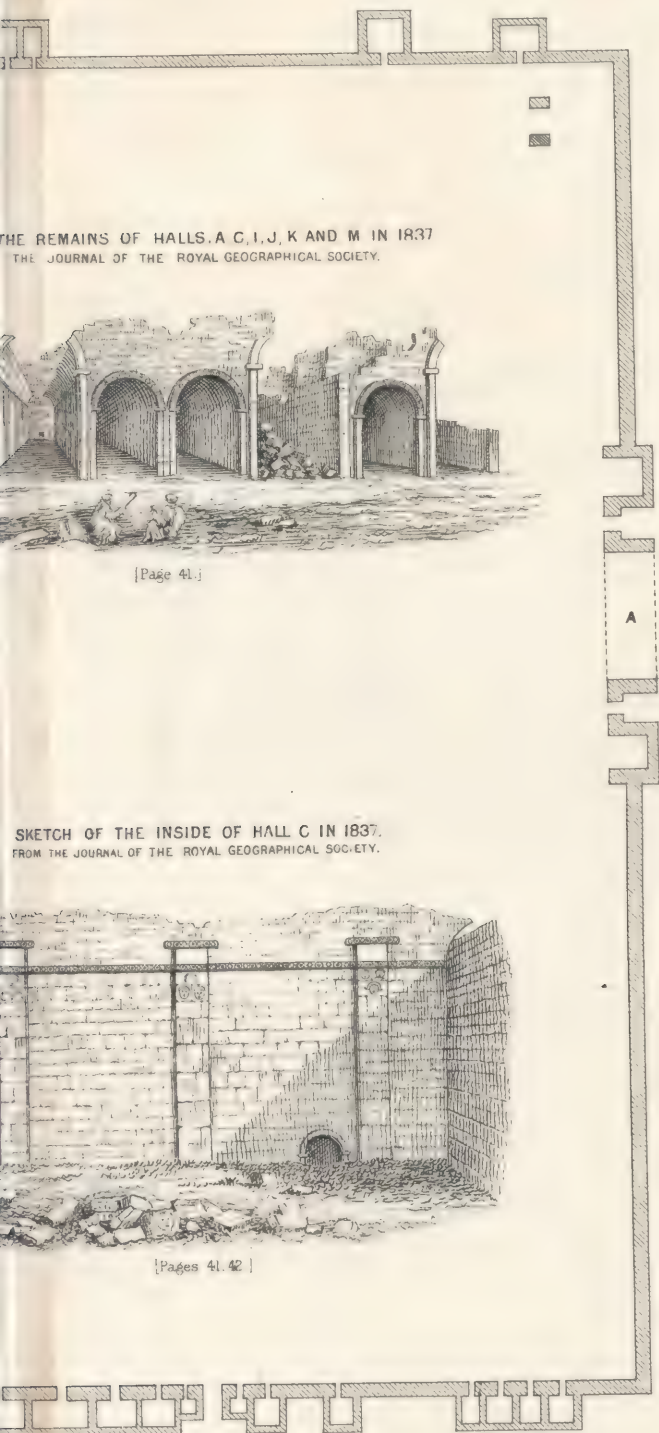






GROUND PLAN OF THE PALACE OF AL HATHER (HATHRA)  
REDUCED FROM A DRAWING DATED 2<sup>nd</sup> NOV 1846 IN THE LIBRARY  
[Pages 65-68]



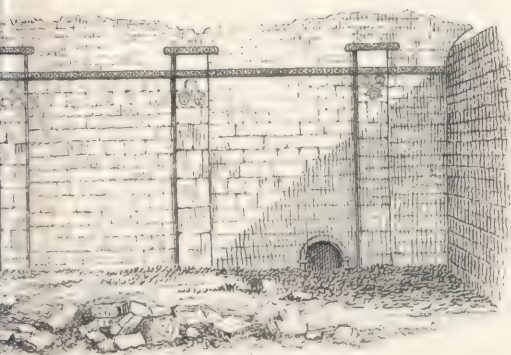


THE REMAINS OF HALLS. A C, I, J, K AND M IN 1837  
FROM THE JOURNAL OF THE ROYAL GEOGRAPHICAL SOCIETY.

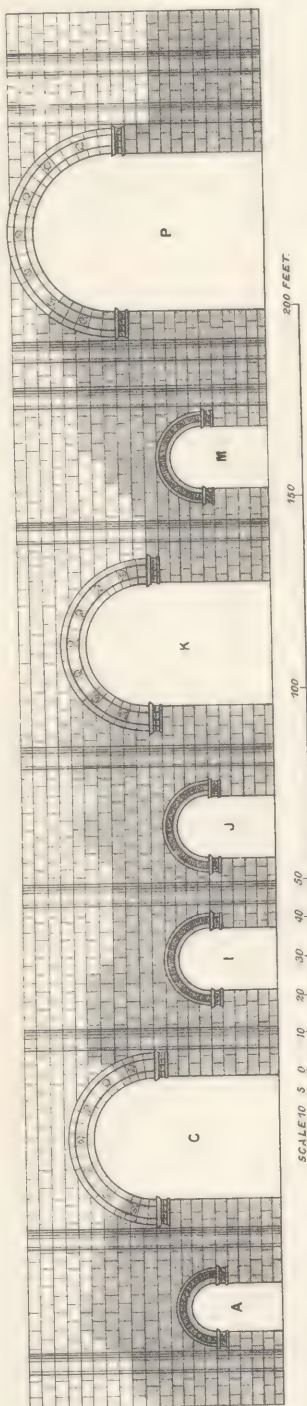


[Page 41.]

SKETCH OF THE INSIDE OF HALL C IN 1837.  
FROM THE JOURNAL OF THE ROYAL GEOGRAPHICAL SOCIETY.



[Pages 41, 42.]



EAST FRONT OF THE PALACE OF AL HATHER (HADHR).  
REDUCED FROM A DRAWING DATED 2<sup>nd</sup> NOV 1846, IN THE LIBRARY.  
[Page 41.]





Mr. Ainsworth's description of "An Excursion from Mosul to Al Hather," published in the 11th volume of *The Journal of the Royal Geographical Society*, also refers to the foregoing account by Dr. Ross, and its perusal will be found highly interesting.

The ruins of Al Hather were subsequently visited, in 1840, by Mr. Ainsworth, Mr. Mitford, and myself. We were able to remain some hours amongst them, but deemed it prudent to return before we had been able to devote as much time to the examination of the remains as they deserve.

In the month of April last, the Chief of the Shammar Arabs being encamped near Mosul, I seized the opportunity to make a second excursion; and having obtained an escort from him and secured his protection, I was able to spend three days amongst the ruins without interruption. I was accompanied

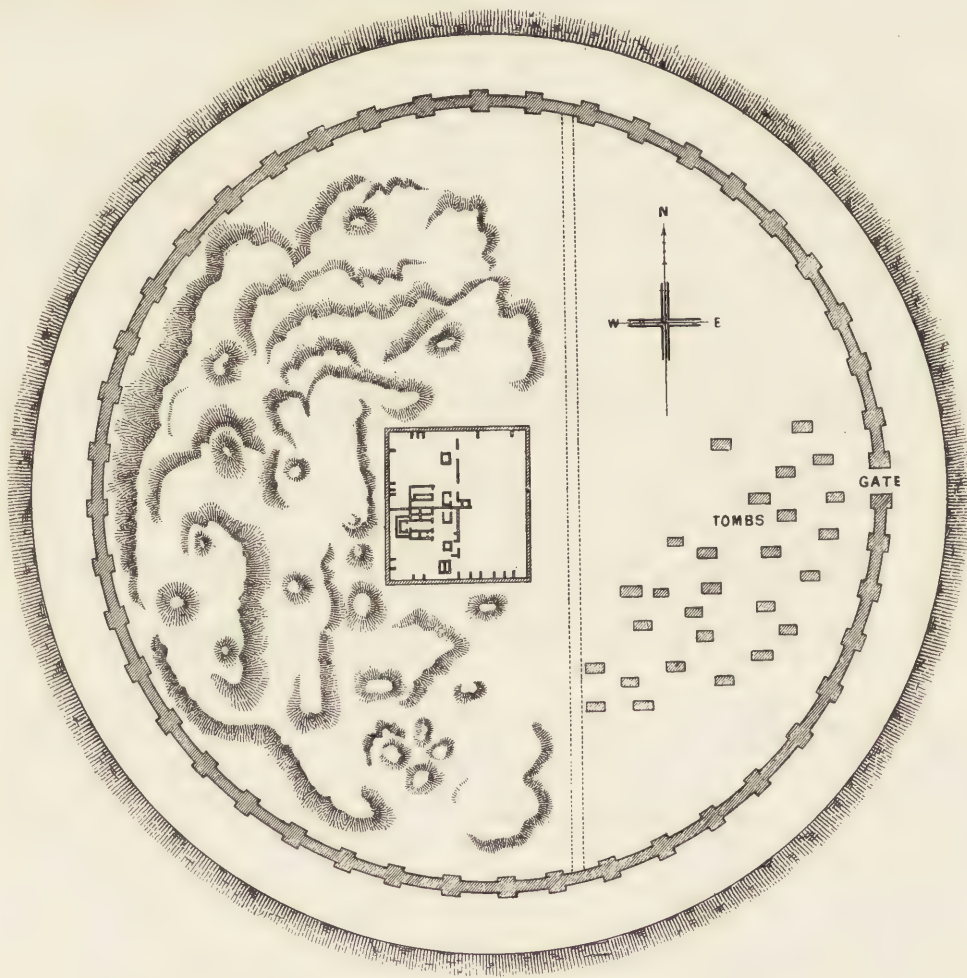


FIG. 19.—GENERAL SKETCH-PLAN OF AL HADHR, FROM A DRAWING IN THE LIBRARY.  
[See Illustrn. iii.]

by Mr. Rassam, British Vice-Consul at Mosul, Mrs. Rassam, and a large party of native gentlemen. Al Hather has only been visited by the travellers mentioned above. The accompanying plans and sketches are of the principal edifice or Palace. The city contains no other building of any importance; the walls and bastions are in good preservation; they are nearly circular, and about three and a half miles in circumference. The other ruins are principally those of dwelling-houses. These are of stone, usually of two storeys, with small vaulted rooms connected by narrow flights of steps.

No. 1 [Illustrn. iii] is a ground plan of the Palace, with its various offices and dependent buildings.

In No. 2 [Illustn. iii] I have also attempted a restored elevation of the façade of the Palace itself, which stands in the inner court. The smaller chambers on the ground-floor are still nearly entire, and the large halls are so well preserved that there is little difficulty in conjecturing their original forms.

No traces of the windows; which must have occupied the spaces between the large halls and above the entrances to the small chambers, now exist, and I am at a loss to know how to restore them. They may have resembled that shown in sketch No. 7 [copy in the Library]; or they may have been grouped together and arched, as at the Palace of Ctesiphon.

On comparing these two buildings it will be found that a great resemblance exists between them, almost sufficient indeed to prove the identity of the epoch of their erection. Although the Palace of Ctesiphon contains but one great hall, flanked by small chambers, the general design of the building is evidently similar to that of the Palace of Al Hather. To this day, the mode of construction adopted by the Sassanian Kings of Persia has been preserved in most parts of that country, particularly in such provinces as are exposed to great summer heat, such as Fars and Khuzistan.

The centre of the house is usually occupied by a hall of large proportions, always vaulted and completely open on one side (generally on the north) to the air. The hall is called the *Aiwan*, and extends the whole depth of the building. It is only abandoned during the winter months, and is a cool and pleasant residence during the hot weather. The *Aiwan* is flanked by a number of small rooms, generally forming two storeys. These are used for winter residence, and are at other times occupied by guests and servants.

The whole building stands in the centre of a courtyard ornamented with gardens, reservoirs, and fountains, and is usually surrounded by a series of apartments used as offices, &c.

The Palace has three *Aiwans* [Illustn. iii, C, K, F], but in other respects resembles in its plan, although of course on a very large scale, the modern houses of Shushter in Western Persia. The dependent buildings which surrounded the Palace at Ctesiphon have long been buried in ruins; scarcely any traces of them remain; but it is probable that the *ensemble* was originally such as above described.

It will be remembered that the Palace at Ctesiphon was constructed of brick, while that at Hatra is built entirely of hewn stone. The height of the arch of the great hall at Ctesiphon is actually 106 ft. from the ground, which may be somewhat raised by the ruins, whilst that of the outer hall of Al Hather could scarcely have exceeded 60 ft. I endeavoured to obtain an exact measurement of the latter, but was unable to do so on account of the rubbish which had accumulated within and around the building.

The *Aiwans* were furnished with great luxury and splendour; it was probably to the *Aiwan* at Ctesiphon, still standing, that the magnificent carpet, found by the Arab conquerors on the sack of the city, appertained. This carpet, as stated by Gibbon, was of silk, sixty cubits square, with a paradise or garden depicted on the ground; the flowers, fruits, and shrubs were imitated by the figures of the gold embroidery and the colours of the precious stones; while the ample square was enriched by the variegated and verdant border.

Both at Al Hather and at Ctesiphon the rings and nails from which lamps and tapestry were suspended are to be found on the walls and ceilings. I was, however, unable to find any remains of the capitals of the columns and pilasters. It is probable that a simple cornice, with an ovolo, or some such ornament, ran round the whole building, and formed at the same time a kind of capital to the pilasters. Such a cornice may still be traced on the outer wall and on the square pilasters at the back and sides of the Palace. The roof was evidently flat, and formed an extensive terrace, to which staircases led from various parts of the edifice.

I subjoin a detailed description of the ground plan [Illustn. iii]—A, a chamber 28 ft. 7 in. deep and 20 ft. 3 in. wide. The entrance is 14 ft. in width, and is formed by an arch richly adorned with human busts, enclosed by a narrow frieze. The head-dresses of these figures, which are both male and female, are extremely varied and peculiar. They generally resemble those found in Persia on monuments of the Sassanian dynasty, and are elaborately ornamented with curls which project considerably from the head; many of the figures have helmets and caps of various shapes. The draperies are richly decorated with jewels and ornaments. A cornice, with a double row of acanthus leaves, runs along the interior and exterior of the entrance immediately below the spring of the arch. The cornice, frieze, and arch are similar at the entrances of the three outer chambers. B, a second chamber leading out of A, 25 ft. 9 in. by 20 ft. 5 in., receives no light but by the doorway. C, a large hall or *Aiwan* 98 ft. 8 in. by 49 ft. The ornaments over the arch differ from those at the entrance of the



small chamber; two plain stones occur between each head or bust; the cornice has but one row of acanthus leaves, beneath which runs a spiral. Within the hall are six pilasters, three on either side, decorated with human heads. Four of these pilasters have two heads beneath and one above; in the other two the order is reversed. The arch of the vault springs from the summit of these pilasters. A cornice with ovolos runs round the hall about six feet from the top of the pilaster, and a second cornice with a simple spiral ornament occurs about 10 or 12 ft. from the pavement. In sketch No. 5\* I have endeavoured to convey an idea of the present state of this hall, and No. 6\* is a drawing of one of the pilasters. D, a chamber leading out of C, 31 ft. by 20 ft. 9 in. The doorway is ornamented with a cornice elaborately carved into a kind of network; the chamber has no window. E, an isolated hall, surrounded by a lofty vaulted passage. The entrance is blocked up by fallen stones, and I was unable to enter to take the dimensions of the hall, which, however, I should say may be about 50 ft. square, and the width of the surrounding passage averages about 11 ft. This passage is lighted by occasional windows, but the inner hall receives light through the doorway alone. The cornice, which crowns this entrance, is richly sculptured with human busts and fabulous animals, which may perhaps have reference to the worship of the Persians. A slight sketch of a part of this cornice [fig. 3 *ante*] is given in the 11th volume of *The Journal of the Royal Geographical Society*. The vaulted passage is about 65 ft. feet in height. F, staircase within the wall leading to a terrace on the summit of the building. G, a lofty inner apartment 37 ft. 5 in. by 27 ft. 4 in. lighted by a small window opening into an upper chamber. The cornice over the doorway leading from C is similar to that over the doorway at D. The marble carving appears to have been originally painted. On one of the centre stones of the vault are several words in the *Pehlivi* character, but there was not light enough for me to read them. They establish pretty satisfactorily the Sassanian origin of the building. H, a chamber 25 ft. 9 in. by 21 ft. 8 in. without windows. I, a chamber 21 ft. 8 in. by 21 ft., with an arched recess 11 ft. 6 in. in height opposite the entrance. The cornice and arch over entrance the same as in D. A wall here divides the building and the inner court into two parts; it may have been the division between the apartments of the men and women, as in modern Persian houses. It may have been built after the Mohammedan occupation; but as there is no communication between the rooms in the two compartments, and the hall itself appears to belong to the same period as the rest of the building, it would rather refer it to the original founders. J, a chamber 56 ft. by 23 ft. 4 in. A simple cornice runs round the room at the spring of the vault. A staircase leads into a subterranean chamber, but the entrance is blocked up. K, large hall or *Aiwan* 98 ft. 5 in. by 48 ft. 10 in. The northern side and a large portion of the entrance have fallen in. There are two pilasters standing on the southern side, each decorated with two heads. The arch over the entrance and cornice are similar to those of C. A cornice, supported by the fore part of bulls, runs round the room about ten feet from the ground. L, a chamber, the entrance to which is blocked up. M, a chamber 26 ft. 2 in. by 20 ft. 8 in. Arch over entrance and cornice similar to those of A. The apartments N and O are without windows; the first 19 ft. by 20 ft. 11 in.; the second 40 ft. 2 in. by 21 ft. 6 in. P, a large hall or *Aiwan* 74 ft. 6 in. by 58 ft. The facings to the inner walls have fallen, and the hall is nearly filled with rubbish. Q, an inner hall, 25 ft. 3 in. by 58 ft., vaulted at right angles with the outer *Aiwan*. R R, reservoirs or fountains. S, entrance into northern compartment of inner court. T appears to have been a small temple, 37 ft. 10 in. by 25 ft. 9 in. One column of the prostyle is alone standing. No traces of the capitals remain, and I cannot conjecture their form. They were probably comprised of some ornaments altogether foreign to the Five Orders. The two small rooms at the side have two similar rooms above, with which they are connected by a staircase. This building stands on a platform raised about 14 ft. from the level of the court. U, a building composed of an *Aiwan*, 74 ft. by about 50 ft. The arch and cornice over the entrance similar to those over chambers A, I, and M, the bust being larger in proportion to the size of the arch. The rooms at the sides have two rooms over them. I need scarcely describe the various apartments which surround the outer and inner court; they differ in size, are all vaulted, and are built of hewn stone. They were probably offices and rooms for the guards and officers on duty at the Palace. The two opposite the Palace, X X, are lofty and massive, containing several rooms, and are two storeys in height. The entrance

\* Neither of these sketches appears to have been preserved; but a sketch by Ross, of Hall C, as it was in 837, is given in *Illustn. iii*, and the pilaster is shown in fig. 2 *ante*.

into the outer court, V, is in ruins, and I was unable to trace the details. There are some ruins nearly in front of this entrance, which may be those of a triumphal arch, or some such building. The walls which form the outer and inner courts and surround the building, are built of cut stone, and are seldom less than six or eight feet in thickness. They form, consequently, a kind of fortification to the Palace.

There is little to be added to the above description. The two courts appear to have been paved with stone. The reservoirs were supplied by deep wells, which still exist. The water was conveyed through a small channel cut in the pavement and crossing the court. The stone used in the building is a fossiliferous limestone, said to have been brought from the Sinjar Hills. The blocks are well cut, neatly fitted, and firmly united by a very fine and tenacious cement. The stone, from its nature, is subject to rapid decomposition, and the ornaments and sculptures have been much injured by exposure. The ruins have assumed that rich golden tint which adds so much to the beauty of the great ruins of Syria.

There are sculptures in very high relief, such as a ram with tail of a fish, human busts, &c., on the face of the Palace, the use of which is not apparent. They may have been simply intended for ornament.

Mr. Ainsworth, in his memoir, has mentioned the peculiar marks which are to be found on almost every stone employed in the buildings of Al Hather, and has given representations of many of them; he seems to attribute some mysterious meaning to them. I have found similar marks on numerous buildings of the Sassanian epoch—for example, at Bisutun and Ispahan. In the latter city I was first induced to look for Sassanian ruins by seeing these marks upon stones employed in modern edifices, and I soon succeeded in finding several fine Sassanian capitals. I believe these marks to be purely fanciful, and not to be the letters of any particular alphabet—letters from a variety of alphabets may be traced amongst them. They appear to have been used for building purposes, and not to have reference to religion or astronomy. They occur on the face of the stones, in the centre, each stone being provided with one mark.

The want of symmetry in the architecture at once strikes the eye. The height of the arches as well as the width of the entrances, in the façade, vary; and it is not improbable that there were pilasters over the lower arches, as at Ctesiphon, where the same neglect of the rules of Western architecture is observable. It is evident that the style of architecture itself has been borrowed from the West, and has been adapted to the tastes, manners, and climate of the East. The same thing is visible in most of the Sassanian monuments existing within the ancient limits of Persia; and there are few travellers who do not attribute the elaborate sculptures of Tak-i-Bostan, near Kirmanshah, to Roman artists.

A. H. LAYARD.



LXXVIII.

DECORATIVE PLASTER-WORK. By E. S. PRIOR, M.A. Cantab.,  
*Fellow*; Mr. G. T. ROBINSON, F.S.A.; Mr. HEYWOOD SUMNER; and  
Mr. STEPHEN WEBB.

Mr. Alfred Waterhouse, R.A., *President*, in the Chair.

DESIGN.

MR. PRESIDENT AND GENTLEMEN,—

WHAT should design be for plaster? How should we architects design for it? The material has its own province, its legitimate indulgences and its limitations. If these are not taken into account in our designing, if we transgress the limits, there will be produced no design of ours at all; at best, the work will be a contemptible hybrid between what we meant to achieve and what the material lends itself to. The worker in the material must supplement or disguise our ignorance, and in effect re-design the whole himself. To avoid this catastrophe, we are driven to study first principles. This is the sort of intellectual research which we professed designers of architecture, who design sitting at our drawing-tables, have to initiate in every domain of craftsmanship. That this is so is surely an indication of some inherent defect in the position we assume to fill. It is a confession of malady that such problems arise for us at all. The first principles of design should not have to be reasoned upon. We should leave that to the Professors. The capabilities and limitations of the building crafts should be ours by the intuitive perception of *personal practice*; the knowledge should be ingrained in us, and not require seeking. It should have come of actual finger-service in the crafts themselves—from our having made ourselves, not professors of designing, but artists in the arts of building.

If this seems too ambitious, or, should I say, degrading, at any rate we should have had in our pupilage a constant intercourse with real artists,—the workers at these crafts,—so that their methods of working, and the aims of their arts, may have become familiar to us before ever we thought of drawing designs. As it is, we begin at the wrong end. We are brought up to think that learning to design is learning to draw

designs. It is left for us to find out, in practice, how ineffectual paper-work designing is, and that the medium in which the work is executed is the only one in which it can be designed. The consciousness of this drives us to set our imaginations at work to conjure up in each several case the material for which we are professing to design. The imagination has a very hard task. In default of actual personal acquaintance, however, we are happy to hold on to some system of rules; to throw the responsibility on precedent, on the examples of masterpieces of established reputation, or, perversely ambitious for originality, we evolve out of our consciousness everything that ought to be. This system we call the principles of design—and by its help we strive, with great thought, after an ease which should come to us without any thought at all.

Under such conditions we may be excused for having some misgivings whether an architect, as at present constituted, should attempt to design decoration when he can only do it imperfectly, and with great uncertainty as to the result. It is much easier to fall back on the commercial design of the commercial executant, and let the Firm do it all. But often our conscience rebels, and we struggle out of the dilemma with a miserable compromise. The result of these strivings, and alternate surrenders and compromises, is to be seen in the plaster ornamentation which plasters, but does not ornament, our fashionable buildings of recent years. May not some true principles of design in plaster-decoration be deduced from these examples by the process of renunciation? Let us not design in these fashions. Let us renounce designing for plaster decoration until we have ourselves learnt to model; and, above all, let us renounce commercial art, and allow none of it to be perpetuated in our name.

This conclusion is plainly unphilosophical and the advice unpractical. The commercial art of the enterprising shopman is *the art* of the day; since we are a profession, we must profess to design plaster decoration, as well as everything else. It may give us hardihood for the venture to feel that we have exercised our ingenuity at any rate in discovering some principles, even though they may fail us just where we want help. First of all, then, plaster is quite the most impressionable of all the materials which give us architectural surfaces. Its response to the hand of the craftsman is sympathetic and immediate. It has not to be chiselled, like stone or wood, or to have ideas hammered out of it, like iron: a touch of the finger gives it life. And just in measure with this gift of susceptibility is its power of expression. It lends itself to express all ideas without constraint. What vigorous brutality it has! As witness that famous house-front at Ipswich. What refined, if nerveless, elegance we find in Adam's ceiling work! Do we want sumptuous decoration? Speke Hall shows us with what prodigality plaster can give it. Again, what cameo-like delicacy of ornament is revealed to us in the stucco vaultings of those tombs in the Appian Way, the like of which excited the enthusiasm of *Morto* and *Giovanni*!

Again, how accurately do English seventeenth-century plaster ceilings and friezes express the homely magnificence of the Jacobean squire! See, too, in the staircase ceiling at Ashburnham House, with what revel of massive bossiness the vigorous genius of Inigo Jones has delighted itself! The genteel erudition of Sir Christopher Wren



speaks to us in his plaster-work. The solid classicality of his successors comes to the surface in Ware's and Hawksmoor's cornices, while the *essence* of the brothers Adam is in the graceful superficiality of their ceilings.

I am here speaking of plaster used for the effects that are germane to it, and which show its material; not of plaster as a foundation for painting, when its expression must come from the painting and its function is to obliterate itself. But halfway between modelled-plaster and painted-plaster comes sgraffito. To-night we have with us Mr. Heywood Sumner, an artist in sgraffito, whose work shows that idyllic charm can still be gleaned from country life and country labour, to be expressed in plaster decoration. But even an undecorated skin plaster has expression in accord with the material which it covers. What a satisfying texture the work of two hundred years ago had! Honestly and roughly laid it was, on our old rough church walls and ceilings. We are prone to sweep it away contemptuously, substituting smooth, insipid three-coat work, and wonder that the old value of the wall has gone.

Thus in quickness, and veracity of its interpretation of the ideas of the artist, plastering may compare with etching; and in designing for such an unerring interpreter we must be careful that we have something to express. If we have not, the plaster will surely show up the insincerity of our aspirations. Can we nowadays say that we do care for anything strongly enough for us to make it a *motif* for decoration? Our great deficiency is that our passions are mere make-believe. A passion that is dead can be parodied with grimace; and are the plaster arabesques, in which we so lavishly indulge, anything but mere grimacing—a stereotyped mimicry of that passionate fervour for antique art that burnt in the old grotesque workers in plaster when the Renaissance fever kindled in their breasts?

We may indeed, some of us, pay a Platonic homage to the great arts of the past, and embody decorous appreciation in plaster designs, essaying to blow a flicker into the old ashes. But it is *sincerity* that the designer for plaster needs, and we should surely fare better by going, like Mr. Sumner, to nature herself. From her perennial sources genuine inspiration can still be drawn, if we have the skill; if we can learn where and how to select the material for decoration. But if this gift of selection—the first gift for a designer of decoration—is denied us, there is still a quality of plaster by which the architect may gain value for his work. The full face of plaster presents us with a breadth of field such as no other building material can give. It has no coursings or jointings such as brick and stone must needs be governed by; there is no piecing or framing such as controls design in wood. Here is a broad material for broad architectonic effects, and we may, with fine large spaces of stucco, with coves and vaults and broad sweeping ribs and moulded cornice-work, achieve an architectural somewhat which may make amends for modern lack of decorative *motif*.

Mr. President, my Paper might seem a plea for the undecorative rather than for the decorative plaster-work; and I would leave it so, if we architects are to remain, as we have been, dissociated from the building crafts, while still we profess to design for them—if we are to continue the insincerity of this profession, disguising our

incapacity with the miserable make-shifts of commercial decoration. To-night, at any rate, we shall associate with workers in plaster—with artists whose own hands are in their crafts.\* If we would learn to get their art for our work, we must come down from the pedestals of professors of design, and take our place beside craftsmen as fellow-workers in the arts of building.

E. S. PRIOR.

### STUCCO-DURO.

MR. PRESIDENT AND GENTLEMEN,—

IN the short time assigned to me this evening I can hardly do more than state the argument of a chapter on decorative plaster-work, an applied art once of very great importance in the history of architectural decoration, now unhappily fallen into desuetude, partly because it was misapplied, and the evil that it did has followed it to the exclusion of the good it is capable of. I must therefore be concise in its consideration, and must generally premise that plaster-work divides itself readily into two main divisions—the one in which *carbonate* of lime forms the basis, and the other wherein *sulphate* of lime replaces this. Of this latter—that is to say, where plaster-of-Paris forms the chief ingredient—I shall not have time to say anything now, but must confine my remarks to the former, which is *stucco* work.

Fine stucco work was very much practised by the ancients, and Vitruvius gives us the recipe for its composition and its manufacture. His directions are that the lime should be of the best quality, tempered a long time before it is wanted for use, chopping it from time to time with a heavy hatchet and beating it well with heavy sticks. The first coat was of rough stuff with broken marble, and as many coats of finer stucco as the work required were laid on this, whilst the finishing stuff was mixed with very fine marble dust, and when dry was polished with marble dust and chalk. With such composition, modelling was readily done, and some work which rivalled metal work or gem engraving was executed, of which we still have some relics, such as those found near the Villa Farnesina at Rome during the canalisation of the Tiber, and evidently work of the first half of the first century of our era [fig. 20]. Whether the Greeks modelled in stucco or not is an unsettled point. Personally, I am inclined to the belief, from the very Greek character of the earliest Roman work we have, that they did. I must not, however, revert to these, or quote the descriptions of classic work buried in the writings of old authors, but rather rush on to the revival of the art in the fifteenth century, and show how its re-creation influenced our own country, for so long a lapse in usage occurred between the fall of the Roman empire and the period of the Renaissance of Art, that it had well-nigh become a lost process. Not that it was entirely lost: like the Roman power, it went eastward, and influenced both

\* Messrs. Witcombe and Priestley are here referred to. During the two hours that these Papers were being read and discussed, they personally executed the plaster decoration of a ceiling designed by Mr. R. Norman Shaw, R.A., for a house in London.



Indian and Arabian art, and it was slightly used in Europe in mediæval times ; but that is another story.

It was, however, the search for the arts of antiquity, on which the Renaissance was nurtured, that led to its revival, and we have many relics of fifteenth-century work, early fifteenth-century too, which show to what a pitch it had been rapidly brought. You will all, I have no doubt, recollect the Winter Exhibition of 1885 at the Royal Academy, when we had some remarkably fine basso- and mezzo-relievos in stucco exhibited, and of which character there are some very excellent examples in the South Kensington Museum, perfectly sharp and good after 400 years' endurance of good and



FIG. 20.—STUCCO, PRESUMABLY OF THE FIRST CENTURY A.D. [see Figs. 104, 105, pp. 213, 215].

Found near the Villa Farnesina, Rome, in 1879, during the canalisation of the Tiber.

(From a photograph.)

evil usage. The great revival of the art as an architectural adjunct came, however, somewhat later, and is due to the partial exhumation of the Baths of Titus by the orders of Cardinal Giovanni de' Medici (shortly afterwards, in 1513, Leo. X.) in his search for antiques. To this great find went Raphael and his friend and assistant, Giovanni da Udine, the latter of whom was particularly struck with the delicately modelled ornament which encrusted the walls, and immediately set to work in experiments to reproduce it. Whether by accident, by research, or from a long traditional survival, his experiments resulted in arriving at precisely the same composition as that given by Vitruvius, the aim being to attain the hardness and whiteness of the



stucco of the ancients—the more recent work, to which I have above referred, being stone-coloured from the use of travertine, and whitened by a couch of white lead ground in water, as appears from a receipt given in the Marciana MS., quoted by

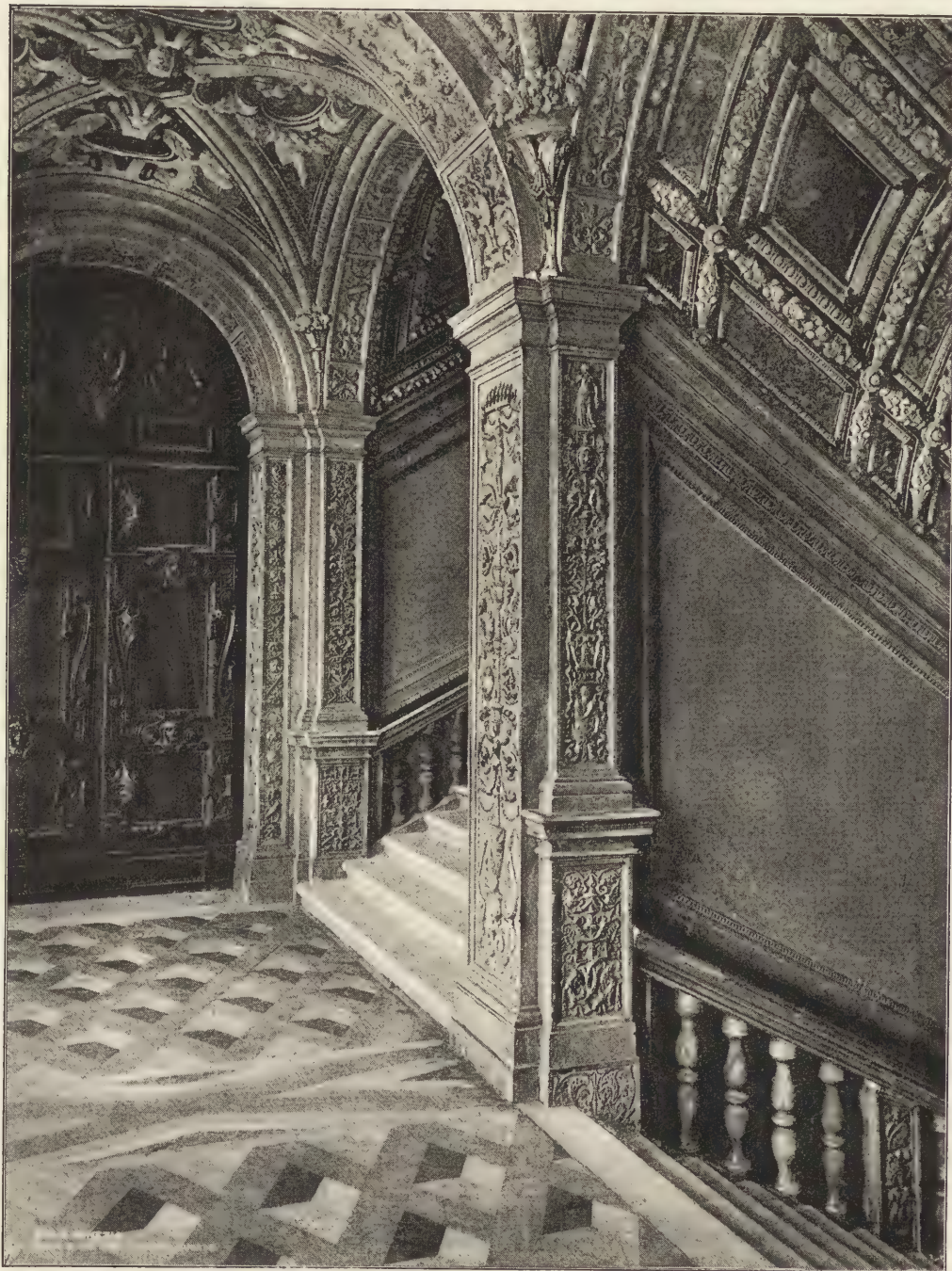


FIG. 21.—THE "SCALA D'ORO," CIRCA A.D. 1550: DUCAL PALACE, VENICE. (From a photograph.)



Mrs. Merrifield.\* Giovanni's success so pleased Raphael that he determined to use it in the *loggie* of the Vatican, and he handed this portion of the decoration over to him. I have no doubt that many of you have remarked how beautiful it is. It is, of course, all hand-modelled, and consequently full of variety, and considering how it has suffered from the rough usage of the soldiery and the populace at various times, from the sack of Rome in 1527 until quite recent days, it is wonderful how well it has stood. The Villa Madama, the now destroyed Palazzo dell' Aquila, and Raphael's own house,—where it was extensively used *externally*,—rapidly followed, and *stucco-duro* was fairly relaunched as an architectural accessory.

For two of these buildings Raphael was the architect, and Giovanni da Udine the designer of their stucco decorations; and in each Giulio Romano was associated as decorative painter. The Papal *imprimatur* and the sanction of the highest artists thus being given to stucco decoration, the art naturally spread rapidly in the capital until the sack of Rome, when all the artists were dispersed, and Sansovino carried it to Venice, where by the aid of Alessandro Vittoria, a very fertile designer, much was executed; I need only refer to his "Scala d'Oro" in the Ducal Palace [fig. 21], and the Libreria Vecchio and the Palazzo Albrizzi, to recall the richness and the beauty of his work. Giulio Romano, in 1524, carried it to Mantua, where, in the Ducal Palace and the Palazzo del T, he raised up an important school of *stuccatore*. Here to assist him he engaged Primaticcio, a young artist from Bologna, who displayed such inventive artistic power and such command of the material, as his friezes there show, that when François I. wrote in 1531 to Italy for a young man who understood painting and stucco-work, Primaticcio was sent to him by Duke Gonzaga, and thus *stucco-duro* crossed the Alps and found its way into France. The Gallery of François I. [fig. 22] and the Bed-chamber of the Duchesse d'Étampes at Fontainebleau demonstrate Primaticcio's genius and skill—particularly so in the latter, where he did his best work, for the duchess was his great ally in his fierce conflicts with the imperious and violent Benvenuto Cellini—and where his long-limbed, heroic-sized figures developed Goujon, Pilon, and the French school of sculpture. Now that the art had come so near us Henry VIII., the pupil of the Italianated Wolsey and the rival in all things of François I., could not rest until it had been imported into England, and he invited many Italian and other foreign artists into this country. Amongst these, as stated in Braun's *Civitates*, 1582, were "many excellent artificers, architects, sculptors, and statuaries," who were immediately engaged by the King to erect that wonderful palace which truly deserved the name of "Nonesuch," but of which unfortunately not a trace now remains. It was begun about 1538, and on plan was a double quadrangular building with lofty pavilions at the angles, and having elaborate porches and salient bays on its sides, with a great clock-tower, and guarded by a gate-house. Built, according to the then custom of country houses, of timber frame-work, it was especially adapted for the display of the new art, and was immediately seized upon by the new

\* See her *Original Treatises, dating from the XII. to the XVIII. Centuries, on the parts of Painting, &c.* 8o. Lond. 1849, vol. 2, p. 638.

craftsmen, the principal of whom was probably Toto del Nunziata. He was trained in the studio of Andrea da Ceri, who acquired his cognomen from his being chiefly engaged in modelling and colouring wax figures for ecclesiastical decorations. Toto's work in England has long been a mystery, though we read of constant payments to him under the name of Antony Toto, he being made serjeant-painter to the king in 1539; yet what he did has always been indefinite. Vasari tells us that "he did all



FIG. 22.—SOME OF PRIMATICCIO'S WORK: GALLERY OF FRANÇOIS I. AT FONTAINEBLEAU.  
(From a photograph.)

"manner of works for the king in architecture, and in particular the principal palace." Now, as the principal palace then erected was "Nonesuch," and as each panel was filled with a coloured stucco figure, this would be exactly the kind of work suited to his training; and I venture to suggest that to his hand this great work in *stucco-duro* was due. It is also noteworthy that Toto's fellow pupil in Ceri's "bottega," Perino del Vaga, was valued by Raphael and Giovanni da Udine as much for his work in stucco as



in painting. It is true that Torrigiano, who came to England more than twenty years before Toto, was a stucco-worker, and wrought in that material for Pope Alexander VI. before he came over; but I have failed to trace that he did such work during his visit to this country. The introduction of the art into England is, in fact, assigned to Toto\*; and as the Italian workmen whom he induced to immigrate and help him were the forerunners of a continuous stream of their countrymen who prosecuted the art here until the commencement of the last century, it will not be impertinent to consider for a moment who and what some of them were. We find amongst them Nicholas of Modena, a "Keruer," as he is styled in the old account-books, who in 1533 was working with Primaticcio at Fontainebleau [fig. 22], where he received 20 livres a month, Primaticcio then being paid 25 livres, a stipend afterwards largely augmented. Also Luca and Bartolommeo Penni, brothers of the celebrated Giovanni Francesco Penni, whom Raphael made his co-executor with Giulio Romano, bequeathing to them the honour of completing his unfinished works. Luca was a friend of, and a fellow-worker in stucco with, Perino del Vaga at the Doria Palace in Genoa, to which place they were driven by the sack of Rome. There was also "Jerome of Treviso," to whom Henry VIII. assigned a stipend of 400 crowns a year, but who, notwithstanding that Vasari tells us he "made many ingenious edifices and one honourable house for the "King's use," was probably rather employed as a military engineer than as an architect or as a stucco-worker. Then there was that mysterious "John of Padua," who came here in 1542, but was probably retained more for his skill in music than for that in architecture, though his patent is granted for both accomplishments. There were, of course, many others less eminent; and these all trained up a school of English workers, who rapidly spread the knowledge and practice of the new art. What these did at Nonesuch is lost to us, and we can only reconstruct the palace at second-hand.

We have an engraving of the palace by Hoefnagle, published in 1582, which shows each panel occupied by a very large figure; and in 1598, Hentzner, a German traveller who visited it, says: "One would imagine everything that architecture could perform "to have been employed on this work. There are everywhere so many statues that "seem to breathe, so many casts that rival even the perfection of Roman antiquity, "that it may well claim and justify its name of 'Nonesuch,' being without an equal." The Duke of Saxe-Weimar, who visited it in 1613, tells us that "the labours of "Hercules were set forth on the king's side, the queen's side exhibiting all kinds "of heathen stories with naked female figures."

During the Parliamentary wars it was stripped of its lead and otherwise despoiled; but Pepys, who saw it in 1665, when the Great Plague drove the Exchequer there, describes "all the house on the outside filled with figures of stories and good "paintings;" and Evelyn, who visited it a year later, when the Great Fire again drove the Exchequer to visit it, says: "I took an exact view of the plaster statues and bas-

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\* See the TRANSACTIONS 1867-68, p. 225, for a description of "Nonesuch" quoted by the late Sir Digby Wyatt from *The Gentleman's Magazine*, 1837, in his Paper on "The Foreign Artists employed in England during the Sixteenth Century, &c." See also *Archæologia*, xxxix., 1863, pp. 33 *et seq.*

"relievos inserted 'twixt the timbers and punchions of the outside walls of the court, " which must needs have been the work of some celebrated Italian. I much admired " how it had lasted so well and intire from the time of Henry VIII., exposed as they " are to the air, and pity it is they are not taken out and preserved in some dry place : a " gallery would well become them. There are some mezzo-relievos as big as life. The " story is of the heathen gods, emblems, compartments, &c." The last record I can find of it is that of Peter le Neve, who saw it in King James II.'s time, and says that it was " done with plaister work made of rye dough in ymagery very costly." This is an interesting tradition, for it is very probable that rye-meal was used to prevent the too rapid setting of such large surfaces, thus enabling the modelling to be longer continued. *Sic transit gloria mundi*. And that is the last we know of the stucco-worker's craft at "Nonesuch"; but the fashion thus set prevailed long in England, and, in fact, during the latter end of the sixteenth century, and throughout the seventeenth, there was scarcely a mansion in England which did not set forth the stucco-worker's or pargeter's craft outside or in, and often both. We find mention of an English stucco-worker of renown as early as 1547—the year of King Henry's death—a Charles Williams, who had travelled in Italy, and who probably worked at Nonesuch. He wrote to Sir John Thynn, who had just commenced rebuilding his house at Longleat, offering his "services in supplying internal decorations " after the Italian fashion"—services he evidently rendered satisfactorily, for Sir William Cavendish and "Bess of Hardwicke," his wife, being at that time busy at Hardwicke, wrote to Sir John requesting the use of this "cunning playsterer," who they hear had made "dyvers pendants and other pretty things, and had flowered the Hall at "Longleat," to do like work for them at Hardwicke. Probably the frieze, still to be seen, on the ruined wall of an upper room in the Old House, now known as the Giant's Chamber, is his work. The great frieze representing the stag hunt in the State apartment at New Hardwicke seems to be later and to be less carefully executed than that in the Old House, but is probably the work of the school he established there.

It was, however, rather in the cunning distribution of formative panelling than in figure modelling that the Englishman distinguished himself. Our native craftsmen seem to have developed a ceiling treatment for themselves, in no way founded on Italian tradition or practice. Using the arrangement of the fan-tracery of the late Perpendicular Gothic as a model, they founded an entirely new treatment of ribs and pendentives, often of most intricate geometric arrangement, as you will see by reference to the works of Nash and Richardson. Nor was this without other reason than their want of artistic training in the plastic art; for the lowness of our rooms required a less ambitious treatment than did the large and lofty halls of France and Italy. Their first essays seem to have been confined to repetitive patterns of small area, and the reproduction of the ceiling of Sizergh Hall, now being fixed at the South Kensington Museum, will serve to illustrate how the pendentive fan-traceried pattern was adapted.

This pendentive system outlived the radial tracery form, from which it sprang,



though the radial root form often exists on pendants, even when there are no correlative ribs on the ceiling. An illustration of pendentives without radial ribs is shown in fig. 23, the moulded ribs being replaced by flat strap-work, covered with the most delicately modelled foliage in very low relief. After the abandonment of the pendentive the geometric arrangement of the ribs soon became infinite: interlacing quatrefoils, squares, lozenges, and circles abounded, many of the arrangements being equally beautiful and ingenious; but rarely were large figure subjects introduced amongst them, small emblems, armorial bearings, and personal devices being used to fill up the



FIG. 23.—THE "FISH ROOM," AUDLEY END, BY BERNARD JANSEN, CIRCA A.D. 1615.

(From a photograph.)

voids of the geometric pattern. Gradually the size of the subdivisions increased, until it became the practice to divide the rooms into four quarters, and, no matter what their size, unless they were long galleries and corridors, the pattern occupied a quarter of the space, reversed; this made half the room, and that half doubled completed the design. The enlarged cartoon thus obtained led to the abandonment of merely geometric pattern, and soon lines of wondrous device took possession of the ceiling—involved, contorted, with quaint unexpected quips and cranks—a true parallel, in fact, to the quaintly involved literary diction of the time. Of such is the ceiling



shown in fig. 24, where the cartoon covers a space of 33 ft. by 15 ft., being one-quarter of the ceiling. In the earlier ceilings these ribs were plainly moulded after the manner of groin ribs. As the power of execution grew, they had flat surfaces often ornamented by impressed ornament, run on by a revolving stamp like a bookbinder's tool, with here and there a bossage of higher relief from a wooden matrix, fashioned like a butter-



FIG. 24.—LIBRARY AT AUDLEY END, BY BERNARD JANSEN, CIRCA A.D. 1615.

(From a photograph.)

stamp. These ribs have moulded edges and handwrought bosses at their junction, producing an exceedingly rich effect. English ceilings, indeed, particularly commended themselves to our foreign visitors. The Duke of Wurtemberg, who visited England in 1592, was delighted with the ceilings at Theobalds and elsewhere; and when we recall the sumptuous ones at Canons' Ashby and Castle Ashby (1580–1601), at Stockton (Wilts), Little Charlton (Kent)—which I cite only as types amongst Elizabethan mansions—and attempt to realise them in their contemporary decoration, where, as Spenser says,

Gold was the parget, and the ceiling bright  
Did shine all scaly with great plates of gold,—

we cease to wonder at such admiration.



Although the country abounded with English plaster-workers during the period between Henry VIII. and Elizabeth, there still flowed a stream of Italian artists into England. B. Ridolfi, a relative of Palladio's principal stucco-worker, worked here in 1550; G. Nanni in 1564; in 1570 Lionardo Ricciarelli, who was one of those who did the beautiful work in the courtyard of the Palazzo Vecchio at Florence; and in 1586 came Luca Romano, who had been at work at Fontainebleau, with doubtless many other artists whose names are not recorded.



FIG. 25.—DRAWING-ROOM, EASTON-NESTON HALL, NORTHANTS, CIRCA A.D. 1700.

(From a photograph.)

In James I.'s time we have typical examples in Audley End, executed about 1616 [figs. 23 and 24], Crewe Hall, Charlton (Wilts), Aston Hall, erected about 1620, and exterior work at Maidstone, and hosts of other glorious examples in England; and now Scotland inaugurated the Union by revelling in rich stucco-work. Sir Henry Wotton, too—that "honest man who was sent to lie abroad for the good of his country"—advocated the use of stucco-work. "Plastique," says he, "is not onely under sculpture, "but in deed very sculpture itself, with this difference, that the plasterer doth make "his figures by *addition*, and the carver by *subtraction*," and he urges us not to content ourselves "in the gracefull fretting of roofes," but, as the Italians do, "applie it to the "manteling of chimneys with great figures." During the reign of Charles I., the

fashion of reticulation began to fall into desuetude, and a larger canon was given to the compartment under the Palladian influence of Inigo Jones, but the centres and smaller compartments were filled with exquisite low-relief work, in which delicately modelled figures prevailed; and that the troubles of the times which followed did not destroy the stucco-worker, Sparrow House, at Ipswich, is typical evidence. With the Restoration design improved, and during the reigns of Charles II. and James II. the influence of the French taste of Louis XIV. largely prevailed—the result of that enforced exile which so many of the more wealthy and educated had to endure. The floral festoons which played so large a part in decoration then were admirably modelled—too minutely, perhaps, and too like wax-flower modelling to be truly good in art, yet admirable for technical skill. It was, indeed, rather in detail than the general spirit of design that the decorative character of the style of Louis XIV. was followed in this country; nor do we find many Italian stucco-workers visiting England at that period. Only two can be traced between 1643 and the close of the century, most of the work being done by English artists, such as that in the church of King Charles the Martyr at Tunbridge Wells, and houses in that neighbourhood which were executed by Weatherhel and Hoogood. In old Montague House Frenchmen were employed by the French architect Puget, but, as a rule, the decorative plaster-work of the time was done by native artisans. Wren tried to refine the work, and this decidedly on French lines. In a letter from Paris he especially commended the work of the Louvre, adding—“Van Ostal and “Mr. Arnoldin, plasterers, perform the admirable works at the Louvre.” With the advent of William III. and the more settled state of the country the art revived, and Italian workmen began again to return, and henceforward the style of the latter end of Louis XIV. and that of Louis XV. prevailed, and the English stucco-worker became facile in the new mode. A good example of the revived Italian character will be found in Easton-Neston [fig. 25], near Towcester, executed for Hawksmoor about 1700. Gibbs, another pupil of Wren, was a great patron of the craft, and especially of two Italian artists, Artari and Bagutti, whom he described as “the best fret-“workers who ever came into this country.” Their work will be found in the churches of St. Martin’s-in-the-Fields and St. Mary-le-Strand, in much of Gibbs’s other work at Cambridge and elsewhere, in many private houses, such as “The Priory,” Reigate, and others to which Gibbs made additions. These have a strong Italian feeling. Meanwhile, the English workers followed the French mode to such an extent that the critics cavilled at it, and Ware, writing in 1756, fell foul of the old modelled work and French taste. “A ceiling,” said he, “straggled over with arched lines, “and twisted lines, and tangled lines, and OC’s and C’s, and tangled semicircles, “may please the light eye of the French, who seldom carry their observation further “than a casual glance.” “The French have furnished us with abundance of fanciful “decorations for these purposes, little less barbarous than the Gothic.” So British purity would now have none of them.

The cold Northern blood of Sir William Chambers aided this, and he imparted a severer character to the stucco-work of his time. Joseph Wilton, the son of an eminent



plasterer, and one of the first of the Royal Academicians, did some stucco-work for him. Clerici, an Italian sculptor, did more, but we had then two eminent English stucco-workers, Thomas and Charles Clarke (1783), and the work of all these is to be seen in Somerset House; but the best work of the Clarkes will be found in Ireland, where many admirably modelled ceilings of the middle of the eighteenth century exist. Joseph Rose was also very notably engaged in stucco-working in London and the country, doing elegant work for James Paine, the architect (1745), having probably been trained under Artari and Bagutti; to him was apprenticed John Papworth (died 1799), grandfather of Mr. Wyatt Papworth, to whose learning and courtesy I am greatly indebted for much information on the subject. Some admirable work of his and of his son Thomas, done for "Athenian" Stuart, can be seen in the chapel of Greenwich Hospital. Thomas Papworth died in 1814, well-nigh the last survivor of a line of craftsmen to whom decorative art is deeply indebted. The last modelled stucco-work done in London was, I believe, that in Hanover Chapel, which we are just now about to destroy. The "Compo" work favoured by the Brothers Adam, which miserably replaced the old art, does not come within my subject; but it is interesting to note that the first English practitioner of it was John Jackson, the grandfather of the present representatives of that firm which has largely kept alive the more modern phases of decorative plaster-work.

And now, after this hurried scramble through three centuries of stucco-work, and after the lapse of one in which it cannot be said as an art expression to have existed, I would plead for its restoration. It is quite easy to manipulate, as I know by experience. With good lime and a little selenitic lime, it will last as long as it ever did; or for interior work a little marble dust will render it bright, hard, and washable. Our Departmental Schools are turning out hosts of modellers who have enough technical facility to do all that may be needed, and only lack two things: your direction and guidance, and on their part sufficient humility to put on a blouse and mount a scaffold. This last is perhaps the more difficult to obtain, though the knowledge and the study of what the old workers in *stucco-duro* did should fire their ambition to revive so useful and so pleasing an occupation.

G. T. ROBINSON.

#### A CEILING IN GESSO AND PLASTER.\*

1. *The Subject*.—This ceiling [Illustr. iv] was designed for the late Dr. William Spottiswoode, F.R.S., in 1880. The main mouldings which separate the panels (left blank in the plate) represent the position of existing mouldings, and my work was to

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\* The Saloon, at Combe Bank, Sevenoaks. Designed by Mr. Walter Crane, and executed by him, assisted by the late Osmund Weeks and Messrs. Jackson & Sons.

fill the blank panels thus spaced. The theme of the design is a combination of the planets and the seasons and times of day. The centre circle represents the revolving wheel of the seasons, with the sun in the centre, and the signs of the zodiac on the rim; two winged figures support the circle at each end of the panel, and two fans repeat the radiating and circular forms. In the long panels right and left are (right hand) Mercury in the circle, Morning in the square below, Noon above, while Evening and Night fill the corresponding panels on the other side, with Luna for the centre. These subjects are connected and enclosed by a framework of figures typical of the Hours, with globes, and sickles, and hour-glasses. At each end of the central panel is a squarish panel filled by a figure of Jupiter and Saturn respectively, enclosed in circles, with smaller figures at the corners representing their satellites, crescent forms being afterwards adopted for these. The four panels at the corners of the ceiling represent the planets Mars, Venus, Urania, and Neptune. These figures are about 5 ft. high.

2. *The Method.*—The figure panels were all worked in gesso (or rather stucco, consisting of plaster of Paris, size, and cotton-wool) upon fibrous plaster panels, with a roughish ground supplied by Messrs. Jackson & Sons, of Rathbone Place, who also executed the casts of the repeating portions from my models, and also the repeating mouldings of the framework; but casting was only used for the repeating portions of the work; all the rest, both of the figure and ornamental work, was done in the stucco direct on the panels, which were worked in the studio, and afterwards put up.

The ceiling was coloured in tones of white and yellow metal and bronze, repeated in different proportions in the general scheme of colouration in the room.

WALTER CRANE.

### SGRAFFITO.

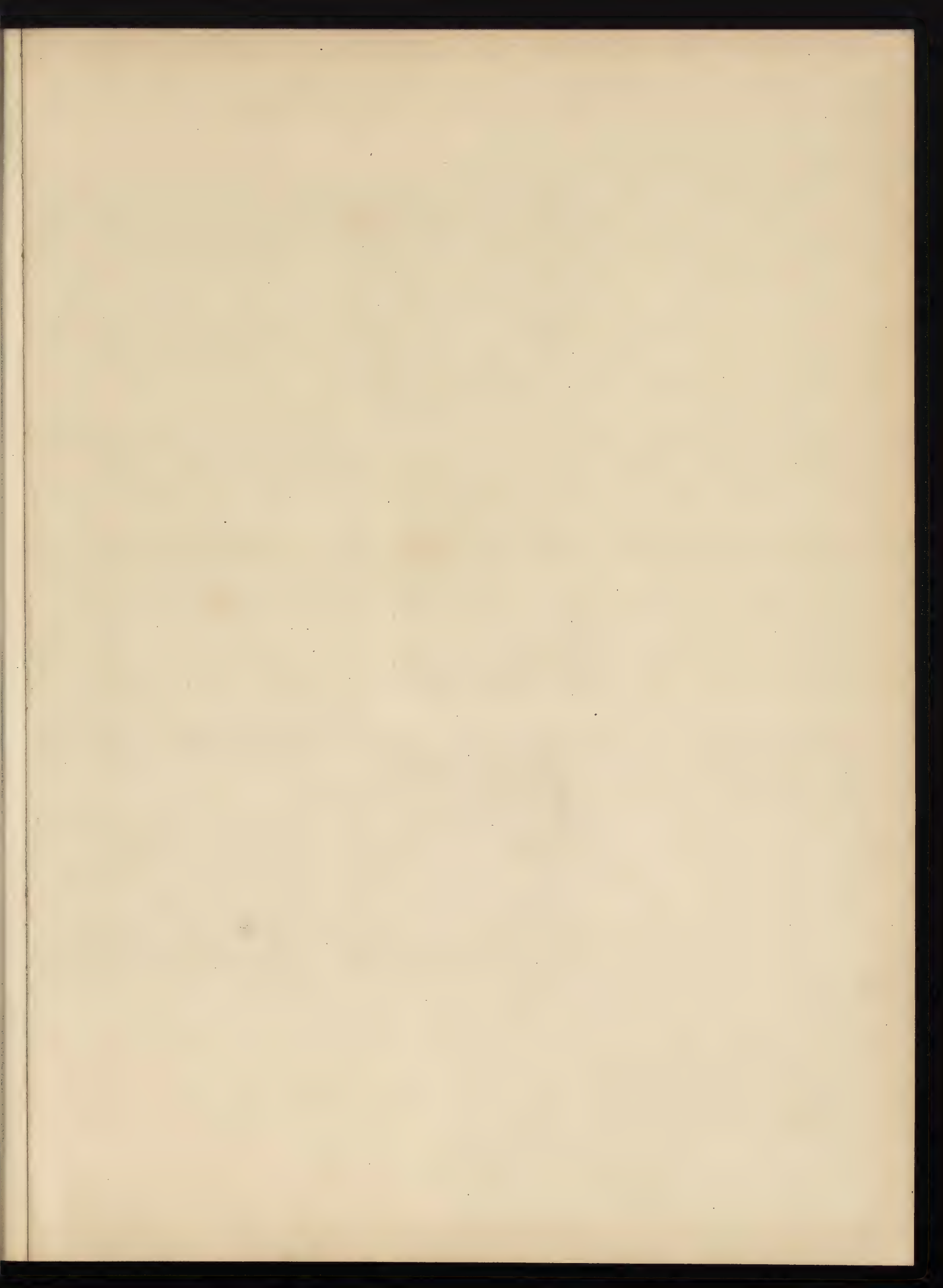
MR. PRESIDENT AND GENTLEMEN,—

**I**T having been suggested that I should give an account of the method of executing Sgraffito-work,\* I gladly comply. In this particular instance [Illustrn. v, and fig. 26] the surfaces treated were inside chancel walls, brick-lined, on which a coarse coat was laid a fortnight before the work was commenced (gauge of coarse coat:

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\* Mr. Heywood Sumner read a Paper on this subject before the Society of Arts, published in the Society's *Journal* on the 13th February 1891, which should be consulted by the readers of this short practical account of his method here given. The beginning and end of the previous Paper may be usefully quoted:—The Italian words *graffiato*, *sgraffiato*, or *sgraffito* mean "scratched"; and scratched work is the most ancient form of graphic expression and surface decoration used by man. The term "Sgraffito" is, however, specially used for decoration scratched or incised upon plaster or potter's clay while still soft; and for beauty of effect depends either solely upon lines thus incised, according to design, with the resulting contrast of surfaces, or partly upon such lines and contrast, and partly upon an undercoat of colour revealed by the incisions; while, again, the means at disposal may be increased by varying the colours of the undercoat in accordance with the scheme of design. Now, it would be a curious and an interesting piece of research to trace this simple form of craft







FROM A COLOURED DRAWING BY WALTER CRANE.

DESIGN FOR A CEILING AT COMBE BANK, SEVE

Executed in Gesso. The repeating portions and mouldings cast in plaster; coloured in to





The Phototype Co., Printers, 203, Strand, London.

KS—THE PLANETS AND THE SEASONS—BY WALTER CRANE.

white and yellow metal. and bronze. Scale, one-quarter of an inch to one foot. [Page 83.]









From a Design by Heywood Sumner

THE BAPTISM

DECORATION IN POLYCHROME SGRAFFITO  
CLARE CHURCH

South Wall





THE OPEN TOMB.

C. KELL, PHOTO. PROCELS & CURTIS, ST. HOLBURN, E.C.

THE NORTH AND SOUTH WALLS OF THE CHANCEL.  
KILDARE, IRELAND.

Each to one foot.

1897.





1 Portland, 3 coarse sharp sand), left with a rough surface so as to give plenty of key. A portion of a frieze or flowing border, which formed part of the Sgraffito decoration worked upon it, is shown (though only in black and white) in fig. 26.

The first thing to be done when I began work was to space out the design on the coarse coat; and as a polychrome effect was aimed at, the colour register was obtained



FIG. 26.—PORTION OF THE BORDER, IN TWO COLOURS, OF A CARTOON [ILLUSTN. V.].

(Reduced from a photograph of the executed work.)

by getting up the cartoons (already pricked) in their place and pouncing the outlines. This being done, and care taken to fix the register nails securely, the different spaces of colour, as shown in the cartoon and pounced in outline on the coarse coat, were then marked in with a brush, in white oil-paint, the letters Y., R., G., &c., as the case might be, being placed inside the spaces thus marked, in order to show the plasterer where to lay the different colours, yellow, red, green, &c. This done, the wall was given as much water as it would drink, and the colour coat laid in accordance with the lettered spaces on the coarse coat, taking care not to displace the register nails, and leaving plenty of key upon the finished surface gauge of colour coat—1 of old Portland, 1 of sifted silver sand, 1 of powder distemper colour.

In laying the colour coat you have to calculate how much of the colour surface it may be advisable to get on to the wall, as it is better to maintain throughout the work the same duration of time between the laying of the colour coat and the following on with the final surface coat—for this reason, that if the colour coat sets hard before you lay the final coat, you will never be able to get up the colour to its full strength wherever it may be revealed in the execution of your decoration.

When the colour coat was quite steady and firm, and all shine had passed from its surface, as much of the final coat was laid as might be finished in a day's work.

from the rude but graphic scratchings of primitive man down to the present custom of scratching mock stone joints on stuccoed walls, but such a review would be quite beyond my scope, and would belong rather to archæology than to art. My present purpose is to approach Sgraffito from the craftsman's point of view, and to record my experience of that branch of sgraffito-work which deals with plastered wall surfaces. . . . Splendid story-telling art has been produced in the past by means of incised surface-decoration, as well as sumptuous backgrounds (the cypress-wood chest fronts and graffiati-ware at the South Kensington Museum bear witness to my meaning); and should the craft of Sgraffito become more popular in the future than it is at present, and should men again strive for that combination and unity of the arts in production which give genius to a locality and fresh spirit to generations of beholders, I hope that more artists will then recognise the fair field that Sgraffito affords for design that is not restricted to "repeats," though its means may be scanty, and that may be made truly to belong to the place for which it is specially intended, and where it is actually executed. But the manner of doing this—there lies the difficulty. It is easy to throw out a suggestion, or to recognise the wide permission of treatments granted by past examples of surface-decoration, but to achieve real, ideal results in any art or craft is quite a different matter.—H. S.

When this had gone off properly the cartoon was replaced in its proper place as shown by the register nails; pounced, removed, and the design cut, as quickly as possible before the plaster set.

The final coat used for this work was of Parian cement, air-slaked for twenty-four hours to retard its setting, and with some ochre in the water with which it was gauged, so as to give it a creamy tone when dried out.

In cleaning up the ground of colour which may be exposed, care should be taken to secure a similar quality of surface throughout the work, by which means may be obtained a broad effect of deliberate and calculated contrast between the trowelled surface of the final coat and the scraped surface of the colour coat.

HEYWOOD SUMNER.

#### MODELLING FOR PLASTER-WORK.

MR. PRESIDENT AND GENTLEMEN,—

IT is not proposed in this short Paper to say anything of the various plastic or other materials which are usually either modelled or carved *in situ*, or of the methods used in the execution of such work. My purpose is rather to point out what I consider to be the surest means of obtaining a satisfactory final result, when one is making models in clay or some other plastic material, with a view to their being moulded, reproduced in plaster, and finally used for the enrichment of friezes and the decoration of ceilings. Some of my remarks in regard to the distribution and arrangement of the various parts of the ornament in ceilings must necessarily apply to the decoration of all large surfaces in any material carved or modelled, but I have endeavoured to confine myself in this Paper as closely as possible to matters peculiarly applicable to modelling for ceilings and friezes.

The first, and one of the most serious difficulties which presents itself to the architectural modeller, is that of scale. He *must* acquire the ability to see his work, *not* as it appears on the easel in his studio, but as it *will* appear when fixed, ultimately, in relation to its structural and architectural surroundings, and to those forms which it is intended to enrich and beautify. This matter of proportion or scale is of the essence of the craft, since neither delicacy of modelling, fertility of resource, nor the power to bring beautiful and decorative forms into harmonious relation to each other will ever condone the least fault in the matter of scale—at any rate, no architect is likely to condone such a fault for any of these reasons. Such advantage as there is in doing the work *in* the place instead of *for* the place where it is to be seen must be so obvious to practical minds, that I need not go into that here. If, however, I might be excused for obtruding a little of my personal experience, I would say something of the disadvantages of this sort of work.

There may be people, for aught I know, whose enthusiasm for their work enables them (so to speak) to lose themselves in it and to become oblivious to their outward



surroundings. For my own part, I must confess that when I have been engaged on a ceiling or other work in a new house, sometimes before the glass has been put in, before the windows have been glazed or the doors fixed,—with a keen north-east wind coming through those openings,—I have never been able to find the secret of becoming so absorbed in the work as to be unconscious of the draught, and of its probable consequences. As a matter of fact, the advantage of being able to see the work in its place while it is in progress is not really so great as it would at first appear, except to the inexperienced workman. The faculty of seeing in the mind the effect of work at a given distance, while modelling it, is one not very difficult of acquisition by an observant man, provided he comes to the work properly trained, and armed with the necessary previous knowledge of his art. In many places where these things are made there is sufficient opportunity for a student to learn how to do them; and I might here perhaps furnish a hint as to how he may get some special knowledge of a very important branch of the art. A clever and thoughtful man who is able to profit by other people's mistakes, as well as by his own, need not travel very far about London, or any other large city, in order to acquire quite a liberal education in the important matter of how *not* to do decorated ceilings and friezes.

The treatment of the modelled work in a frieze, compared with that of a large surface such as a ceiling, is a fairly simple matter, and may be quickly disposed of. If the architect has sufficient confidence in his modeller to leave to him the selection, arrangement, and disposition of the purely decorative forms—and I humbly suggest that this, though it involves the necessity for the possession of some little courage on his (the architect's) part, might be more frequently done without any disadvantage to the result of the work—he (the modeller) sets to work first of all to divide his frieze into the most convenient lengths for repetition. In this he is guided by the architectural arrangement of the walls; or, should there be no pilasters, &c., on the walls to guide him, he will, if possible, so arrange the panels or divisions of his ceiling that the large forms which mark the divisions of his frieze shall occur at the principal places of intersection of the ceiling mouldings with the cornice. Having settled this, there remain to be considered scale and projection of parts.

The general architectural features give him the scale, and for the projection he must be guided partly by the structural forms, and a good deal by the kind of light in which his work will be mostly seen, viz., the angle at which the greater portion of the light enters the room and reaches the work. Should a considerable distance intervene between the top of the windows and the ceiling, or should, for any other reason, the light be cut off from the upper part of the windows, it will be necessary to make the work in fairly high relief, and somewhat flat on the surfaces, in order to get definition of outline. On the other hand, when the light is high, such a treatment results in a harsh, coarse effect. Great care is in this case needed to avoid coarseness by the modification of the outline, and to get variety by a studious management of the surface planes. I may say here that in a frieze exposed to a strong side light it is necessary to exercise extreme care with the vertical lines, or lines running in a more or less vertical

direction, since, with the same projection from the surface, the resulting shadows are much stronger than from other lines. In the latter case, too, the surface texture needs more care perhaps than in the former; but I will not enlarge on that here, as I have something to say about it later on. As a matter of fact, in nearly all the very bad examples of frieze design with which I am familiar, so much care has been bestowed upon the surface that in the end there is no texture at all, as an artist understands it.

Where the human figure is introduced into work of this kind, it should be done with the utmost care, since, while the lack of care or skill in the arrangement or distribution or even the drawing of the ordinary decorative objects might be sometimes overlooked by anybody but an expert, the incorrect modelling of a figure, simply as a figure, or its unskilful application to the design, is always obvious and always disastrous. Use the figure, however, in such a manner as to assist rather than interfere with the design; and if this needed any corroboration, I would point to the fact that few really successful examples of its use are to be found in these days. There is seldom much to complain of in the manipulation or drawing of the figures as figures—even the worst failures of this kind frequently give evidence of skill, on the part of the craftsman, in the delineation of the human form. But the impression generally conveyed to the mind of a trained artist, when he looks on one of these productions for the first time, is that the producer must have designed and modelled his ornament first, and then bought a figure at a shop, or got one somewhere, and inserted it wherever there happened providentially to be room in the composition for a figure to sit or stand or sprawl. If there be any motive at all apparent, it is that somebody has been extremely anxious to show what an intricate knowledge he possesses of the manner in which the human figure is made. Now that is a matter which, interesting and important as it may be to himself personally, has no interest or importance in this connection to anybody else, since we can, any of us, find that part of the business better done in the first fairly good group of statuary which we meet with. Assuming the necessary knowledge of the drawing of the figure on the part of the artist in this work, what we want of him is, that he show us how it may be used in some fresh and artistic combination with other forms, so that a man of cultivated taste may receive pleasure in looking at the composition as a whole; and also, that we of the craft may not only receive pleasure, but haply some guidance to our own efforts in the same direction.

Leaving the frieze and coming to the ceiling, we are met at once by greater difficulties, and at the same time by infinitely greater opportunities for the expression of anything we may have to say by means of our art.

If I may be permitted, I would like to mention an incident, or rather to repeat a remark which exercised some influence on my own work of this kind. It is a good while ago now that I was asked to say something on this same subject at a gathering somewhat similarly constituted to the present one. In the discussion which followed my remarks, one gentleman, for whose opinion about most matters connected with art I entertain a good deal of respect, had taken no part, and I was a little anxious to



know what he thought about it. When pressed for an exposition of his ideas, he got up and said roundly that he had never been able to see why anybody should put decoration on ceilings at all. That was a point of view with a vengeance; and from our point of view the worst of it was, that he was able to adduce one or two of what at first sight appeared to be astonishingly good reasons for the faith that was in him. One of these reasons was that, as he said, nobody ever looked at the decoration applied to the ceiling of even a moderately large and fairly lofty living-room, since the physical effort entailed by the attitude necessary to look at the ceiling is painful, and cannot be sustained for the length of time required to master the details of any really interesting scheme of decoration. Another objection was, that one of the most important functions of a ceiling is to reflect light downwards from it, and that this object was frustrated more or less by the use of decoration; but this last objection did not, of course, apply in the same degree to modelled work simply as to that in which colour was also used. Now, the decoration of the ceiling of a living-room certainly is open in a greater or less degree to both these objections; but in the case of the first, though one cannot see the whole of a ceiling at once, one can, without any special effort, see a sufficiently large section to comprehend the general scheme and motive of the design. In planning the ornament, however, it is well to keep this objection in mind, and to lay the modelled forms out and connect them with each other in such a manner as to avoid all complicated or intricate combinations. The plan of the decorations must, of course, be in direct relation to the architectural details on the walls, cornice, &c., and this the architect will be pretty sure to have something to say about. The modelling—when it comes to that—should, I scarcely need say, be entirely in character and keeping with all the other decoration in the room. But the *treatment* of that modelling in the case of ceilings must be entirely different from that adopted for work in any other situation.

Raising and playing with the edges of forms, of which such effective use can be made in the modelling of the frieze, is hardly ever admissible for ceilings. In fact, nearly all the ordinary means in use by modellers, by which effect is got, are rather worse than useless here; and though I think I am able to see why you should model things on ceilings,—since, properly, nothing else gives such an effect of completeness to the decoration of a room,—still our friend's remark applies, and affects me in so far that I feel that modelling on ceilings should never be in the smallest degree assertive, but should be done in such a way that its special treatment may serve as—I was about to say—an apology for its being there at all. In no other relief-work with which I am familiar is the necessity for self-repression in the artist so constant, or any indulgence in striving for cheap effect so severely punished, as in this.

I suppose about the best position from which to look at work on a ceiling is an ordinary easy-chair which allows you to lean pretty well back. Now few men have leisure to contemplate their ceilings, or, indeed, any other of their household belongings, until the business of the day is done; and, arguing from that, I take it a man would be likely to see more of his ceiling from his easy-chair than from any

other position, and he could certainly see more of it at once from that position than from any other comfortable one. I am assuming that the man who is to live in the room should be considered a little when these things are done; and if I may be allowed to assume that much, it naturally suggests to the artist a treatment of decorative forms which shall be quiet and reposeful. By that I do not mean that it need be tame or dull; on the contrary, it may be as playful and spirited as you are able to make it. My own plan is to select what I consider the more graceful and manageable forms in the style in which the work is to be done, treating all the minor and subservient shapes and connections very flatly, and the larger forms with extreme care, so that there shall be no abrupt shadows cast from them,—thinking, in fact, most about the management of the light and the preservation of a breadth of effect, and getting no more shade anywhere than is absolutely necessary to define the forms and give expression to the idea. It is, of course, well to vary the central and leading objects as far as it is practicable, since too much repetition is fatiguing over these large surfaces.

I suppose I ought before leaving this part of the subject to say something about surface treatment and texture. I cannot claim to be an authority on this matter, since I have never invented any texture for my own work, nor, indeed, have I ever discovered any necessity for doing so. I *have* an opinion on the matter, however, and it is, that a very great deal of the time spent in the discussion of this and similar matters would, especially in the case of young students of modelling and designing, be much more usefully employed in endeavouring to get a better and more sure knowledge of form, and of the proper quantity and distribution of ornament which should be applied to various surfaces, and under various conditions.

Once a student has made himself sure about these matters, the surface texture may very well be left to take care of itself. If a piece of ornament has been clearly conceived, firmly laid in, and dexterously brought forward to the point at which the last detail may be introduced, it should have a surface then which is far more interesting to an artist than any other. But work done in that way assumes the possession, on the part of the modeller, of a power and mastery of means which are not possessed by all makers of ceiling decoration; and as any hesitation—any feebleness or clumsiness—must appear in work thus left, the usual, indeed the only, thing to do then, is to smooth it all over by a laborious and sometimes costly after-process. I have heard architects and others lament the loss of effect in a piece of work through this process of smoothing, but I do not think there is ever much real harm done, since the very fact of having resorted to it may generally be taken as a pretty sure indication that there was never anything in the surface worth preserving. It is, however, very grievous when, as sometimes happens, in deference perhaps to the prejudices of somebody who should have known better, a really artistic piece of work has to be handed over to the clay-smoother or plaster-carver and its interest destroyed.

Another fruitful cause of wasted time is the effort modellers sometimes make to acquire another artist's manner, as it is called. They admire a man's work for certain



qualities which they find in it, and if their idol happens to be a man of strong individuality, it is almost certain that he will develop, along with the finer qualities common to all good work, certain peculiarities in the use of his means, or the handling of his materials, which are not to be found in the work of any of his contemporaries. Now these peculiarities, which have no sort of educational or artistic value whatever, are promptly seized upon by this class of admirers. All kinds of monkey tricks are employed by them, but at the best it is but pitiful fooling, and can only result in a deplorable waste of time. This kind of manner is the outcome of a combination of mental qualities peculiar to the individual, and is developed quite unconsciously. We may study the principles on which a great man works, and they will be found to be fundamentally the same in all, but his manner belongs to him as certainly as his face does, and we might as reasonably try to acquire one as the other.

STEPHEN WEBB.

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\* \* The Discussion [see verbatim report in *The R.I.B.A. Journal*, Vol. VII., pp. 87-89] was opened by Mr. J. D. Sedding (since deceased), who was Chairman of the Art Standing Committee, under whose direction the subject was brought before the Institute; and continued by Mr. Basil Champneys, B.A., Mr. George Simonds, Professor Aitchison, A.R.A., Mr. Nevill, F.S.A., Mr. Arthur Cates, Mr. J. M. Brydon, and Mr. Witcombe [see footnote, p. 72 *ante*]. A brief abstract of the remarks of some of the speakers is here given:—

MR. J. D. SEDDING, *Member of Council*, said the duty of modelling was brought home to him by Mr. Prior's Paper. He hoped the younger members of the profession would realise its importance, and spend some of their time in learning to model. He thought it would be a great gain for art if the importance of designing religious buildings in the Renaissance style as well as in the Gothic were more understood, and remarked that most of the beautiful work mentioned, especially in Mr. Robinson's Paper, was stucco-work, which some people would be horrified to see in a Gothic church.

MR. BASIL CHAMPNEYS, \* B.A., considered that plaster decoration had been neglected, and that meetings at which there was an opportunity of seeing how work was carried out were worth more than all the theories in the world, as they fixed attention in a way no amount of reading could do.

MR. GEORGE SIMONDS questioned whether, when using very polychrome work in Sgraffito, one was not going rather beyond its element. With reference to moulded plaster-work for artistic decoration, he protested against the repetition of a design, or of certain features in a design, and feared there was a great tendency towards it among modern architects. He sympathised very much with Mr. Stephen Webb's remarks about the use of the human figure. Generally there was a great lack of reticence in friezes and ceilings, where it was greatly needed. He considered anything that brought architects and plaster-workers into closer connection must be better for both.

PROFESSOR AITCHISON, A.R.A., *Vice-President*, thought the idea that ceilings should be untouched by ornament an erroneous one, and that the great charm of such work was not only that it should be artistically done, but that no part should be an absolute "repeat"; the difficulty, however,

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\* See this architect's Paper on "The History and Uses of Plaster-work, especially as relating to Ornamental "Ceilings," in *TRANSACTIONS*, Vol. V. N.S., pp. 123-136.

was the expense. He objected to ornament taken from natural foliage, which was too much used in the present day. Traditional ornament had gradually received those necessary modifications and perfections that a series of skilful men had given it, and was better adapted to its purpose than were forms taken direct from nature.

MR. NEVILL, F.S.A., *Fellow*, referred to the fact that Italian workmen were brought to England by Henry VIII., and stated that there was extant the will of the head of a travelling company, by which he left all his tools and implements, the names mentioned being those of Italians. He had lately come across an interesting class of plaster in the stone districts, especially in that of Stroud, in Gloucestershire. All the old houses were of stone with mullioned windows, and they were ornamented between the stone dressings partly with cast ornaments of plaster, and partly with ornament apparently modelled by hand. The example he had found showed the excellent effect it had of taking off the bare appearance of the house, and adding just that element of fancy which was generally lacking in mullioned windows and stone gables.

MR. WITCOMBE (of the firm of Messrs. Witcombe & Priestley) said the ceiling they were working on was elliptic in shape, the room being 40 ft. by 18 ft.; all of it had to be done by hand. The materials were lime and hair, gauged with Portland cement, by means of which a ceiling could be obtained that never cracked. They used to pick up the surface with selenitic cement, but it could not be depended upon. The second coating was selenitic cement mixed with putty and sand. The ceiling was floated over, the design sketched, and the background scratched through, to form a key to the ornament which was laid on afterwards. The materials used enabled it to be modelled as well six months afterwards as a fortnight. Many people objected to the colour, but that could be obviated: it could be toned down, or painted over.



LXXIX.

THE SCHOOL OF BRAMANTE. By Baron H. VON GEYMÜLLER,  
Corresponding Member of the Institut-de-France, *Hon. Corr. Member* (Paris).

Mr. Alfred Waterhouse, R.A., *President*, in the Chair.

MR. PRESIDENT AND GENTLEMEN,—

THE architecture of the Italian Renaissance developed under two different influences: First, a sort of national instinct, a national longing, which made the Italians strive to recall certain elements of their past, symbolised in the ruins of ancient Rome; and, secondly, by the personal action of a succession of great artists who, representing the general aspiration, showed by their genius to what degree these elements could be adapted or applied to habits and customs of the Neo-Latin or Italian nation, which in the meantime had altered from admixture of the Northern races and the teaching of the Christian religion. If one judge only from the executed monuments, four great men, creators of the various types of the Style, represent the different stages of architectonic development during the Italian Renaissance: Brunellesco, Alberti, Bramante, and Palladio. Having, however, looked at their original designs, and considered the period of invention of the forms instead of that only of their application, I have come to the conclusion that the number of these pioneers may be reduced to three, namely, Brunellesco, Alberti, and Bramante.\* Under Brunellesco the Renaissance was merely Tuscan, *i.e.* had a provincial character; Alberti made it more Roman; and Bramante transformed it into an Italian style capable, from its inherent qualities, of becoming universal.

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\* The arguments of Baron von Geymüller in this Paper will be better understood if readers will consult a Notice by him in French and German of the "Life and Works of Donato Bramante of Urbino, wrongly "called Lazzari," which forms part of the Baron's valuable work entitled *Les Projets primitifs pour la Basilique de Saint-Pierre de Rome par Bramante, Raphaël Sanzio, Fra Giocondo, les Sangallo, &c.* Paris and Vienna, text 4o, atlas fo. 1875, pp. 15-101; in the text of the same work a list in Italian is also given, pp. 105-115, of all the buildings due or attributed to Bramante, with many interesting particulars concerning each. The Baron, writing in 1875, maintained that he was not only the first architect, but even the first biographer of Bramante, who had visited all the works attributed to that master.

In following the artistic career of these great masters, it will be seen that some of the individual qualities of each are acquired from his predecessor—that is, from treading exactly in his footsteps. Thus a part of the genius of each continues to live in the works of his successor. A part of Brunellesco continues in Alberti; and though sometimes Bramante goes back to Brunellesco, it is Alberti principally who inspires a part of Bramante's compositions; while many features of Bramante's *later manner* are known to us only by the works of his principal pupils or followers during the two subsequent generations.

As far as I am able to ascertain, Bramante was born in the year 1444, in a small house a little outside of Fermignano, near Urbino, and he died at Rome, on 11th March, 1514. No reliable information exists as to the details of his life until the age of about twenty-eight, when we find him at Milan. A brief mention, however, by a writer living in the middle of the sixteenth century, tells us that he had for masters in painting, Piero della Francesca and Andrea Mantegna.\* This is confirmed by the style of his works. It reveals with absolute certainty that two other masters, both archi-

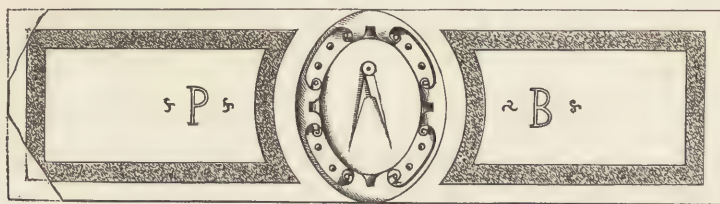


FIG. 27.—DOOR LINTEL OF THE HOUSE BELONGING TO THE BRAMANTE FAMILY AT FERMIGNANO.

tects, exercised so decided an influence on him that he may be called the "continuator" of their style. One of these is Luciano da Lovrana, the architect of the famous Ducal Palace at Urbino; the other, the celebrated Leon Battista Alberti. The buildings and their details contained in the works of both these painters show that even in architecture, and not in perspective alone—for which science both were celebrated—Bramante could obtain from them about the very best information possible at that time. It cannot be absolutely affirmed that Bramante was the pupil, *i.e.* worked under the two great architects Luciano and Alberti; the mere admiration of their works might eventually explain the relation existing between their style and that of Bramante. But the fact of both Bramante and Luciano living in the same small town of Urbino, and that Alberti resided some time at Mantua, where Bramante worked under Mantegna, the most celebrated master living there, renders in both cases a personal contact so very probable that it hardly seems reasonable not to admit it. The style of no other architect in the world is so close to the second *maniera*, or, if I may anglicise it, the second *manner*, of Bramante as the style of Luciano; and the presence of Alberti's portrait in a medallion on an engraving by Bramante

\* Fra Saba Castiglione. Venice, 1554, *Ricordo*, cxi., p. 68. "Bramante . . . discepolo del Mantegna, e "gran prospettiva, come creato di Piero del Borgo. . ."—H. v. G.



seems in this particular case to be a mark of devotion and gratitude towards a master or an exceptionally admired personality. It may therefore be inferred that Bramante enjoyed the immense privilege of having had for masters (or models) the four greatest artists, not only at that time in Italy, but pre-eminent also in modern art. This fact, combined with the study of the Roman remains of Ancona, Rimini, and Verona, so close to Mantua, sufficed to furnish Bramante with all the elements which his style in Lombardy exhibits, without rendering a previous stay at Rome and in Tuscany absolutely necessary. Considering, however, the facility with which artists then moved from one part of Italy to another—far greater than we are inclined to believe—there is more probability, I think, of Bramante having visited Rome and Florence before the age of twenty-eight than not.

#### BRAMANTE IN LOMBARDY.

Before speaking of the activity of Bramante in the service of the Duke of Milan, I must allude to a circumstance which has given rise to much confusion. The term *Stile Bramantesco*, given in Lombardy to the works of the second half of the fifteenth century in that country, the fact that important parts of buildings at Milan had been erected in that style before the arrival of Bramante da Urbino (such, for instance, as parts of the famous Castello di Porta Giovia, the Cappella Portinari, the Ospedale Maggiore, the latter begun by Filarete), and, finally, the fact that Vasari (by one of those confusions too frequent with him) in some places had described Bartolomeo Suardi, called Bramantino—a pupil of Bramante da Urbino at Milan—as one of his masters under the name of *Bramante da Milano*: all this united has induced several Milanese writers, even at a period not very remote, to believe in the existence of an entirely imaginary personality, and to assign to him some of the works of Bramante da Urbino—such, for instance, as the older parts of Santa Maria presso San Satiro.

A close study of this question has absolutely convinced me, with Italian writers such as G. Milanesi, G. Frizzoni, and Antonio Ferri, that this Bramante da Milano, sometimes called also the elder Bramantino, never existed.\* As to the date of Bramante's arrival at Milan, De Pagave, the author of a manuscript study† on the works of Bramante in the Duchy of Milan, living about one hundred years ago, supposes that this arrival had taken place about 1476, a date merely founded on a series of suppositions which do not stand a close investigation. I am obliged to assume the date of his arrival to have been between 1472–74, from the mere fact that Bramante must be considered to be the architect of Santa Maria presso San Satiro at Milan, and that the beginning of the works, or at least of the design, of that building cannot be put later.

\* A clever study of Bramante at Milan has been published by W. von Seidlitz in the *Jahrbuch der Königl. Preussischen Kunstsammlungen*, 1887, iv., but it has not induced me to adopt some few opinions in which Herr von Seidlitz differs from mine.—H. v. G.

† It has been since partly published under the title—*I capi d'arte di Bramante da Urbino nel Milanese, memorie raccolte per cura del Dott. C. C.* (Carlo Casati): Milan, 1870.—H. v. G.

*Santa Maria presso San Satiro, at Milan.*—This church, consisting of a transept,

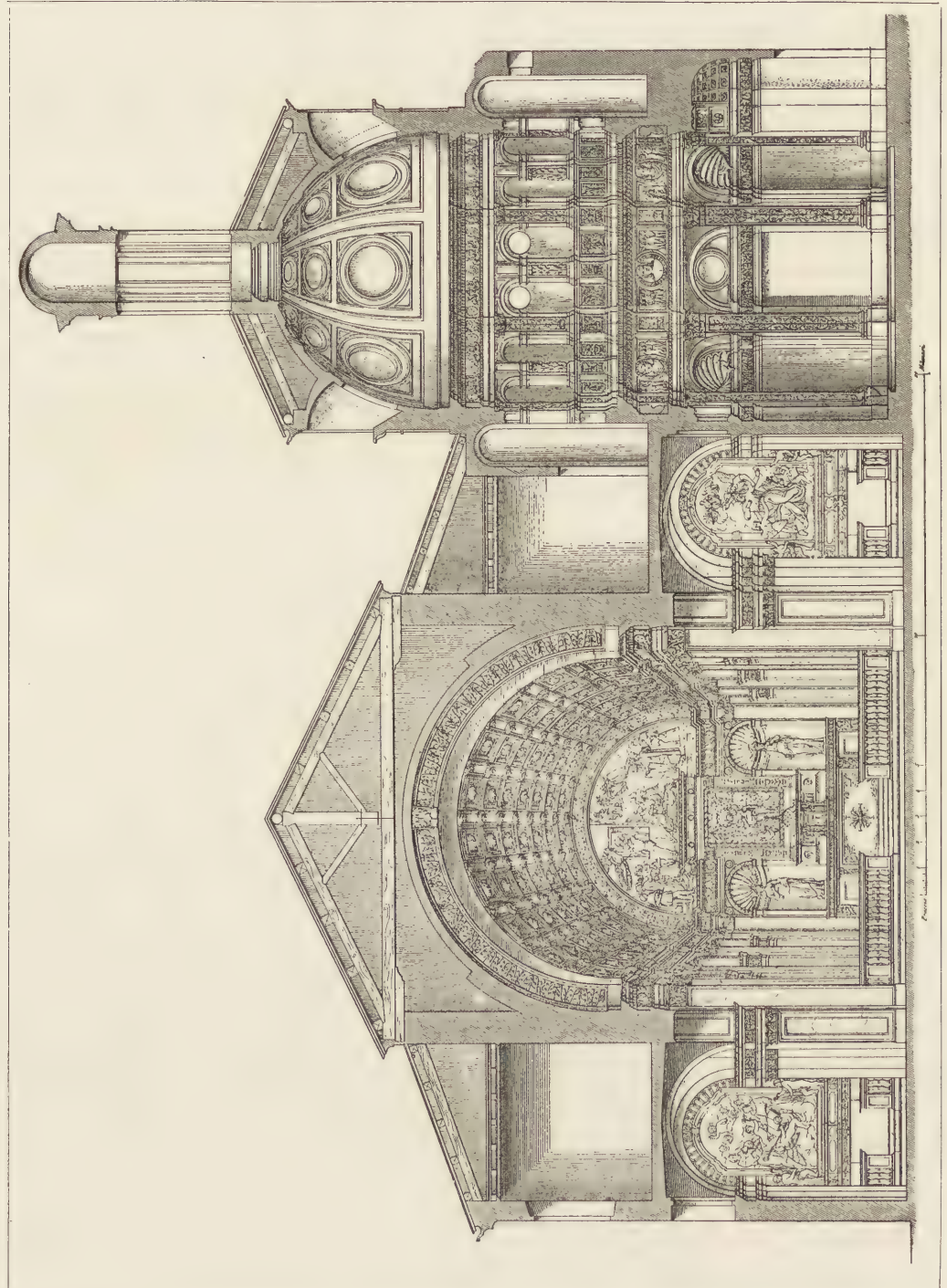


FIG. 28.—SANTA MARIA PRESSO SAN SATIRO, MILAN. SECTION SHOWING THE PERSPECTIVE DECORATION IN BASSO RELIEVO, AND THE SACRISTY.

(From Cassina's *Le Fabbriche più conspiciue di Milano*. Fo. Milan 1844.)

a nave, and an octagonal sacristy [fig. 28], is of moderate size, and is built in terra-cotta



and brick. Its present appearance is due to four successive aggrandisements, which took place during the twenty-eight years Bramante resided at Milan.\* Its façade, showing only one half of its basement, was finished about twenty years ago. Besides being the oldest known building of Bramante—and therefore a guide to the date of his arrival in Lombardy—this work derives its interest from showing how Bramante proceeded under a succession of difficulties which arose from the fact that the plan had to be altered three or four times, in consequence of the greater importance the church was constantly obtaining, and in consequence of the situation of the Via del Falcone and the neighbouring houses, which prevented Bramante extending, as was desired, on all sides instead of in one direction only. Light could not be obtained from everywhere, and Bramante had to fix a part of his proportions from those of the pre-existing chapel—a remnant of the old San Satiro. This explains why the proportions, particularly since the raising of the floor of the church, seem not to be so fluently harmonious as we are accustomed to see them in the works of this master.

In the ancient nave (the present transept) there was space only for a single aisle (the left one), and on the right side only for niches of an elliptical shape, and of very little depth. When the actual nave was built, the Via del Falcone leaving no room for an apse, Bramante obtained the semblance of the latter by a large perspective in low relief [fig. 28], which, seen from the nave, produces a very good effect, and seen from other parts is in nowise ungraceful. The second point of interest in the architecture of this church is seen at each extremity of the transept [fig. 44], divided in the lower half by two pilasters into three arcades, and in the upper half like an open fan by two concentric archivolts united by five round windows, a disposition which has been systematised by Bramante, and was repeated by him at Santa Maria delle Grazie and in other monuments. This arrangement of two concentric archivolts—united by niches or medallions so as to form a single whole—was employed the first time by Brunellesco at the old Sacristy of San Lorenzo, and the Pazzi Chapel at Florence; it was also used by Michelozzo in the Portinari Chapel of Sant' Eustorgio at Milan, whence Bramante could derive it if, contrary to my supposition, he happened not to know the same at Florence. The third interesting feature of this church is its celebrated Sacristy [figs. 28, 29, 30]. Giving up the Florentine custom of placing in octagon buildings a pilaster near the end of each side, but leaving the angles free, Bramante here placed the pilasters in the very angles, breaking them in the middle so that one half is placed on each side. By putting the members which symbolise the idea of supports at the weakest points, he gave the whole a greater appearance of strength. Perhaps no building in Italy produces a more intense charm of harmony both in the aerial and in

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\* Some modern writers at Milan have, it is true, refused to admit Santa Maria presso San Satiro to be a work of Bramante. This proves that they have not sufficient experience in reading the history of a monument as told by itself, and that they overlook a decisive affirmation of Cesariano, a pupil of Bramante, in his commentary on Vitruvius, p. 70, in which are the words: "seu nichie capellette i circuito facte di basserilievo; "como molti moderni hannofacto per la ratione optica . . . si como in la prædicta æde dil Divo Satiro ha architæto epso Bramante." These words have no sense if applied merely to the "Sacristy," and not to the church and, principally the oldest part, the transept.—H. v. G.



FIG. 29.—SANTA MARIA PRESSO SAN SATIRO, MILAN: LOWER STOREY OF BRAMANTE'S SACRISTY.  
(From a photograph.)





FIG. 30. - SANTA MARIA PRESSO SAN SATIRO, MILAN: UPPER STOREY OF BRAMANTE'S SACRISTY.

(From a photograph.)

the linear proportions. The contrast between the alternative rectangular doorways and semicircular niches of the ground-floor, and the triforium-like low gallery of the upper storey with its two arches above each single one beneath; the only light quietly and abundantly falling through eight round windows lying in the curved surface of the cupola and its lantern; the charming and characteristic busts of the medallions, the playing children that hold them in the balustrade—all works in

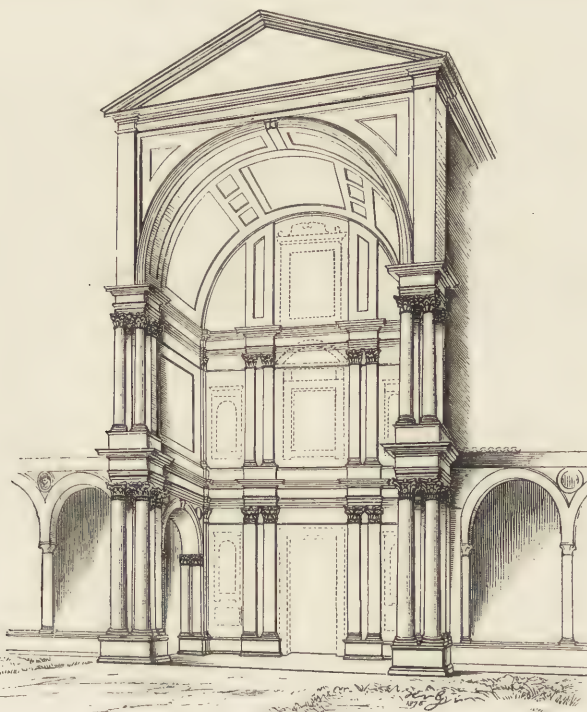


FIG. 31.—FRONT OF THE CHURCH OF ABBIAIE GRASSO.

Begun 1477.

terra-cotta, by the celebrated Caradosso; the exquisite taste of each of the stucco relief ornaments in the pilasters, capitals, friezes, evidently executed under the closest inspection of Bramante, if not modelled by himself,—all these combined transform the small building, which measures only about 21 feet in diameter and about 46 feet in height, into one of the purest jewels of the Renaissance in Italy. Order and freedom, classical details, natural ornaments, and decorative fancy, here already testify to Bramante's highest qualities, and show his mastery in both do-

mains—in the composition of the whole as well as in the details, displaying the utmost enchantment of taste, life, and liberty.

*Abbate Grasso.*—The next work I must mention is the church-front of Abbiate Grasso, near Milan, consisting of one single immense arcade, forming a sort of porch of the entire height of the church [fig. 31].\* The two piers of this arcade consist of two storeys of the Corinthian Order; they form, on each side and in each storey, a group of coupled columns standing before pilasters, composing in this way supports which satisfy equally the claims of richness, strength, and beauty, and out of which, with elastic majesty, springs the immense arch. Here was a new element in modern composition, far surpassing anything existing at Rome, Florence, Urbino, Rimini, or Mantua, a foreboding of the “*nicchione di Belvedere*” which Bramante designed as the central

\* A geometric elevation of the Church of Abbiate Grasso is given by H. Strack, *Central- und Kuppelkirchen der Renaissance in Italien*, Berlin, 1882, pl. 26.—H. v. G.



motive of the grand perspective of courts, stairs, and gardens, by which he united the Vatican Palace to the Villa di Belvedere. The beginning of this work is given by the date of 1477 [fig. 32] engraved in large ciphers under an arch of the ground floor, uniting the columns to the wall of the church.\* Unfortunately, the windows, door, and niches at the bottom of this grand entrance are of a later period.

I cannot hope to describe here all the buildings erected or begun by Bramante in the capital of Lombardy or in the Duchy of Milan,† and shall only allude to those which are interesting, more particularly for the display of qualities characteristic of his genius and his style. As an instance of the latter I may mention also a celebrated engraving ‡ executed by Bramante, of which two copies only exist: one at the Casa Perego at Milan, the other in the print-room of the British Museum. This is not only interesting as an important example of early engraving and etching, but as still showing, in the style of the figures and their execution, the influence of one of his masters, Mantegna; and as forming, in the composition and details of the architecture, a link between buildings erected or designed by Bramante, such as the Sacristy at Santa Maria presso San Satiro, the Church of Santa Maria delle Grazie, the Canonica di Sant' Ambrogio, and other similar works.

1477

FIG. 32.—INSCRIPTION ON THE FRONT [FIG. 31].

*Ospedale Maggiore.*—About 1485 he became architect of the Ospedale Maggiore, and as such had to make in that year a drawing of the building for the Venetian ambassadors; to finish the second storey of the right wing, in which the successor of Filarete, whose work was Renaissance, had fallen back into the Gothic style. He began the grand courtyard, but his arcades were demolished by Ricchino, and only the terra-cotta balustrades and shafts of the columns were set up again on one side of the court.

*Cathedral of Pavia.*—In 1488 Bramante was consulted several times for the Cathedral of Pavia, which, had it been completed according to the original designs, would have been, with St. Peter's, the largest and most interesting Renaissance church of Italy. The ingenious arrangement of the windows lighting the crypt, the beautiful mouldings of the successive *soubassements*, inside as well as outside, are certainly of Bramante's invention; but it is impossible to decide whether the fundamental idea belongs to Bramante, and was considerably spoiled by Cristoforo Rocchi—whose interesting large model is still preserved at the Cathedral, and who was

\* The particular shape of the first "seven," given in order that it should not interfere with the second seven, has made some (*De Pagave*, by C. Casati, p. 75, and lately W. von Seidlitz) believe that the date of the building is 1497. I must adhere to my opinion, not only because the reason for giving this shape to the first "seven" is clear, but also because the style of the capitals of the ground floor, where the date is engraven, is much too remote for the year 1497, and also because, in the later supposition, the difference of style between the upper and lower capitals would necessarily place the former at a date too advanced for their character. The building was never completed; the crowning pediment is still wanting, and the second storey was perhaps erected only after the departure of Bramante.—H. v. G.

† All these works are very fully described in the *Projets primitifs*, pp. 28–63 of the volume of text.

‡ A rough photograph of this print has been presented by Baron von Geymüller to the Library.

entrusted with the execution—or whether the credit of invention must be left to that master, Bramante being only consulted to help him out of some difficulties. I feel inclined to believe that a master capable of so many good ideas would hardly have experienced difficulties in executing them harmoniously, and therefore there is some probability that Bramante deserves the greater part, if not all, of the credit of the invention; but that, as a Ducal Engineer, he was not allowed to undertake a building which was no ducal enterprise, and therefore the work had to be entrusted to other hands.

*Milan Cathedral.*—The intervention of Bramante in the affairs of Milan Cathedral resulted, first, in his giving, in 1488, a model for the central tower, the “Tiburio” as it is called there, and which from the very beginning was, to the population of the city, a favourite part of the monument, at that time the largest in Christendom. The second intervention consisted in a report he was asked for, some time later, on the models presented by a series of other masters for that same Tiburio. A copy, not in Bramante’s handwriting, though most likely written by a clerk at the meeting, is preserved in the archives of the Duomo, and, though not at first clear in every point, is for several reasons very interesting. It manifests in all his criticism of the models of his fellow-architects a remarkable spirit of equity; further, it affords an insight into the ideas which prevailed, alike at the end of the mediæval period and at that period of the Renaissance, as to the proportions which should logically and naturally exist between the different *corpi* of the Church. He reminds the judges that the binding considerations are four, viz.—(1) strength; (2) conformity with the remainder of the building (unity of style); (3) lightness; and (4), beauty. He says that if the engineers, authors of those models, were present, by adding to one model or taking away from another, in the presence of the judges, in less than an hour they could make one that would stand well; and, suddenly breaking off, he says, “But I don’t know why I am saying anything, for I see that “those in whom you have greater confidence are present.”

*Sant’ Ambrogio.*—The Canonica di Sant’ Ambrogio at Milan, though half completed only, and that on a single side, is interesting from the arrangement of the larger central arch and the angular columns. Bramante, alluding to one of the mottoes of the ducal owner of the building, treated those columns as trunks of trees with clipped branches; and the delicate, sober way in which Bramante did it has nothing to do with a childish realism, disturbing in no way the harmony of the whole. The life, elegance, and variety of the capitals, the beautiful proportions of the arcades, and the wonderful mouldings of the central arch, produce the highest imaginable charm, and could not perhaps have been excelled even by the master himself. The style of this cloister, with its dark green marble sculptures on granite shafts, is the same as that of the *loggia* of the Ducal Castle at Vigevano, and of the cloister of Santa Maria delle Grazie at Milan, and the courtyard of the Palazzo de’ Marchesi Fiorenza, also at Milan.

*Santa Maria delle Grazie.*—As this church is one of the best-known monuments of Milan, I have only to urge that the practised eye of an educated architect will



recognise that merely the lower half of the Renaissance part can have been executed under the personal direction of Bramante. In this terra-cotta building, the mouldings, the ornaments of the medallions, are partly in marble; and so are the candelabrum-shaped pilasters, the capitals of which contain some of the most wonderful details in Italy. The inside, under its numerous coats of whitewash, appears somewhat simpler, and was no doubt intended to be the frame of frescoes. The shape of the vault over the choir, with its round windows and medallions, is as pleasing as original. The extremities of the transept afford another example of two concentric archivolts united by medallions, already mentioned in my description of Santa Maria presso San Satiro. Here they frame the apse-like chapels which form the ends of the transept [fig. 45]. The large, well-proportioned, but simple Sacristy is also Bramante's work, which, besides these qualities, is curious from the painted decoration of its vault. All the lines of the lunettes, intersections, and windows are decorated with ornaments held together with a golden string or thin rope, forming knots and lines like those generally produced by braid.\* I have invited attention to this fact because hitherto ornaments of this kind were believed to be a particular whim of Lionardo da Vinci. They are called in the Milanese language "*Gruppi*." Now, in the manuscripts of L. da Vinci, we only twice meet the name of Bramante—once with the brief indication "*gruppi di Bramante*," showing that ornaments of this sort by Bramante were of interest to him. Indeed, the ornaments of this Sacristy are likely to be by far the most important example of such a decoration, the importance of which, however, I by no means wish to exaggerate. It becomes possible that Bramante, whose whimsicality is alluded to by Vasari and confirmed by his sonnets and other signs, may have been the principal promoter of this "fashion." Having published and discussed it in all its details,† I here only ask for permission to recall the existence at Urbino of a drawing for Santa Maria delle Grazie by one of the assistants of Bramante. It bears numerous corrections by the hand of the master, and shows that in the year 1492 Bramante proposed a lantern the outline of which is exactly the model of that pertaining to his *tempietto* in the cloister of San Pietro in Montorio, proving thus that he was in possession of forms which were undoubtedly of an advanced character, at a period much earlier than might have been expected.

*The Cathedral of Como.*—The choir and transept of this Cathedral have sometimes been attributed to Bramante; but this, I think, is a mistake, at least partly a mistake, because they were erected from the joint designs of T. Rodari and Cristoforo Solari. It is, however, partly true, for these portions continue in many respects the forms of the Nave, which is Bramante's work. In fact, I have been led to assign to his skill a door [fig. 33] and three windows on the south side of the building, which have never been brought in connection with his name. The door bears the date of 1491. He must have made the design for the elevation of the sides of the nave. The noble simplicity of

\* Similar ornaments exist in the courtyard of the Casa Taverna at Milan, and have been published by Gruner, in *Specimens of Ornamental Art*, fo. Lond. 1850, p. 76.—H. v. G.

† *Gazette archéologique*, Paris, 1887.—H. v. G.



the walls and buttresses, the beautiful entablature crowning aisles and nave, give more importance to the richness and variety of invention of the three windows which, as



FIG. 33.—COMO CATHEDRAL: BRAMANTE'S DOOR ON THE SOUTH SIDE. BEGUN JUNE 6, 1491. (From a photograph.)

well as the door, served the sculptors of the Rodari family as models for the other



windows of the nave and aisles, and also for the far richer but less noble "porta della Rana" on the north side [fig. 34]. If the beautiful, rich, and tall pinnacles



FIG. 34.—THE RODARI DOOR ON THE NORTH SIDE, CALLED PORTA DELLA RANA. 1505-9. (From a photograph.)  
crowning the buttresses are also to be traced back to models given by Bramante—and



I feel inclined to believe they were—he may possibly be the father of those numerous fantastic and charming compositions at the Certosa of Pavia, and of the buildings erected in France under Louis XII. and François I. They consist in dressing all the parts of a Gothic pinnacle in details derived from the antique; those at Como seem to be the noblest of their kind.

It is impossible to leave the works of Bramante in Lombardy without remembering at least the existence of Santa Maria di Canepanuova at Pavia, and at Milan the house actually called Silvestri, and formerly Scaccabarozzo, on account of the remains of architectonic painting attributed to Bramante. The façade itself seems older than Bramante, but the courtyard is probably his work.

#### BRAMANTE AT ROME.

The fall of Lodovico il Moro put an end to the stay of his principal architect in Lombardy, and thenceforth we must follow Bramante to Rome. Since 1495, one of the richest cardinals, Raffaello Riario, had been building there for himself, from the designs of Bramante, one of the largest palaces of that time, now the Cancelleria [fig. 35]. A letter from the duke to his ambassadors at Florence and Rome, of 11th December 1493, commanding them to search for Bramante and order him to return, proves that at least once he was suspected to have gone to Rome. This was at the very moment when it is natural to admit that the plans for the Palazzo della Cancelleria were being prepared. I have already stated that architects then travelled in Italy much oftener than we are inclined to think, and therefore feel not the slightest difficulty in assuming that Bramante had been there at least once, before definitely establishing his abode in the Eternal City.

If his great companion in misfortune, Lionardo da Vinci, as painter and engineer, thought he could find the realisation of his most sanguine hopes by entering the service of the King of France, Bramante, the "light" of modern Italian architecture, seems to have felt that he could fulfil the duties of his destiny nowhere else than at Rome. When Bramante is mentioned, most of my brother architects think only of two or three buildings in that city—the Cancelleria, the Palazzo Giraud, and the *tempietto* in the cloister of San Pietro in Montorio, the last almost as a plaything. They may thus easily obtain the impression that a notable difference exists between the buildings attributed to him at Rome and those they may have seen in Lombardy. I will not describe the palaces of the Cancelleria [fig. 38] and Giraud here [fig. 39]; I will only allude to the reproach of a certain tameness or want of strength levelled at Bramante in those instances. I admit that this limited idea of Bramante's architectural power, arising from the very flat relief in the palaces of the Cancelleria and Giraud, may seem justified. According to the direction of the Sun, or its total absence, the delicate harmony of their quiet Orders may not be fully appreciated. The fact that these two are almost now the only monuments from which the traveller can form an independent opinion, leads him to see in these peculiar examples the



last and entire expression of Bramante's architectural mind. But this opinion is very incomplete. Far from desirous of establishing, as many seem to believe, in the



FIG. 35.—PALACE OF THE CANCELLERIA, ROME. UPPER ARCADE OF THE COURTYARD. (From a photograph.)

Cancelleria and the Giraud, a model or invariable type for all future palaces, Bra-



mante here simply shows that the highest charm of art can be added to the means usually at our disposal—by appreciating harmony of proportion; by understanding the difference of effect produced with pilasters equidistant, and pilasters alternatively close and distant. Again, in the cloister of Santa Maria della Pace [fig. 36], bearing



FIG. 36.—BRAMANTE'S CLOISTER OF SANTA MARIA DELLA PACE, ROME.

(From a photograph.)

the date of 1504, Bramante showed how, with good proportions, with taste, imagination, and common sense, interest and art can be imparted to works in themselves so slight, that many a less great architect might have thought it not worth while trying to do anything for the work at all, but have left the mason to do as best he could.



Indeed, only two years before this building, his famous *tempietto* in the cloister of San Pietro in Montorio had been completed to its present state.

BRAMANTE'S *Ultima Maniera*.

It was only very slowly, and whilst penetrating gradually more and more into the fragments of Bramante's designs for monuments, which were either interrupted soon after they were begun or considerably altered at a later period, that I came myself to understand precisely that these later buildings form an entirely new phenomenon in the life of Bramante. These were the monuments of his *ultima maniera*,—buildings which made architects and writers of the sixteenth century say that Bramante had produced a revolution in architecture, and that since the ancients he was the first to make good architecture of which he was the "light"; in fact, as Michelangelo wrote to a friend, since the ancients no architect has been greater than Bramante.\* The three principal works designed in Bramante's latest manner are St. Peter's, the Vatican Palace, the Palace of San Biagio (Courts of Law), all in Rome; and the Santa Casa at Loreto.

Let me add that, in Bramante's *ultima maniera*, what some are inclined to call *secchezza*, or tameness, or a want of vigour, is entirely overcome. The shade in the open arcades gives depth to the façades; their strong piers, with half-columns or columns entirely free, sometimes accompanied by gigantic rustications, contained all the elements required to impart the strength and monumental stability absolutely necessary to the immense size and universal character of St. Peter's, the Vatican, and the Papal Court of Justice.

*St. Peter's*.—Permit me to omit any description of Bramante's designs for St. Peter's, because I have tried to illustrate them in a special work.† I believe they form the noblest fortune any architect can boast of, and of which the actual St. Peter's almost gives no idea whatever. Besides the effect of the till-then unrivalled size of the interior, forming one single whole, with the grandest arrangement we can ever use, nothing yet erected approaches the size and majesty of those tripled triumphal arches disposed in the shape of a cross, bearing up to heaven the most harmonious cupola, of which the exterior of St. Paul's in London gives a loving though distant idea. It is absolutely necessary to remember that Bramante's cupola had not been drawn to stand alone, but only to seem perfect when accompanied by mighty angular towers. Each part, in some way or the other, was the most glorious illustration of what can be done in art with the most perfectly regular forms we have at our disposal,—the triangle, the square, and the circle,—employed with the effects of their utmost contrasts as well as with all the mysterious charms of harmony.

The *composition*, the display of the whole arrangement was so appropriate to the

\* To Bartolomeo Ammanati. *Le lettere di Michelangelo Buonarroti, per cura di Gaetano Milanesi*. Florence, 1875, p. 535.—H. v. G.

† *Les Projets primitifs*. In this work Bramante's unexecuted designs are drawn to scale, under Baron v. Geymüller's direction, from the original sketches and from other sources given in the work.

circumstances of the ground and the character of the monuments, that everybody felt it to be the clearest, grandest, and most appropriate solution of the problem. Besides this, each work of Bramante displays some element of the *unexpected*, and thus becomes the source of some charming surprise. In his new Vatican [fig. 37] the harmony of the general proportion, of the projecting pavilions, wings, or towers, that of the retreating fronts, apses, or exedras, the contrasts of the flights of stairs, terraces, and gardens, were only rivalled by the exquisite details that we all admire at the Cancelleria, Santa Maria delle Grazie, or the Canonica di Sant' Ambrogio.

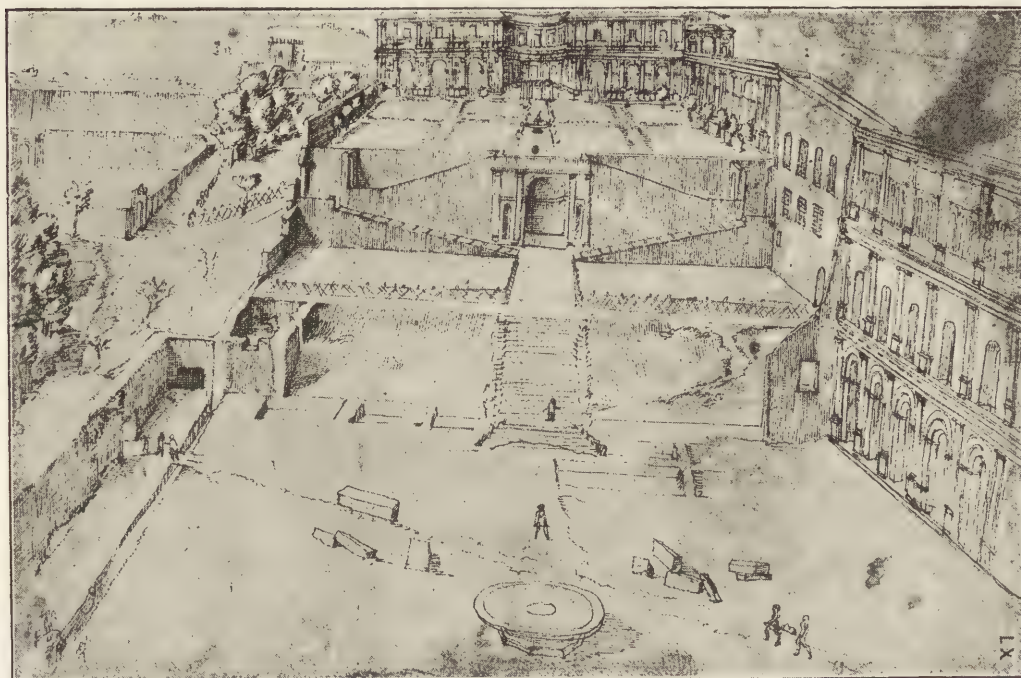


FIG. 37.—THE VATICAN PALACE.

(Photographed from a sketch by G. A. Dosio, made during the building of the Cortile di Belvedere and Giardino della Pigna.)

*Palazzo di San Biagio (Courts of Law).*—This palace, intended to unite everything connected with the Courts of Law, extended from the Via Giulia to the banks of the Tiber, and formed a large rectangular plan, with four projecting towers at the corners, and a fifth higher one in the middle of the principal front over the entrance. This led into a square courtyard surrounded by arcades, on the other side of which, opposite the entrance, was the chapel. Two medals alone give us an idea of the outside elevation: between the central and the corner towers three storeys of round-headed windows or arcades, above which follows the indication of something either like machicolation, or a dwarf gallery corresponding in height to the machicolation of the towers, their battlements rising considerably above the roof or terrace of the intermediate parts; the central tower has two more storeys, each retreating and with *machicoulis* and battlements, the upper storey being crowned with a cupola; the



towers seem to have but one opening in each storey, thus contrasting with the wings. The total length of the front, taken at the end of the stone bench—"muricciuolo" of the Florentine palaces—measures 320 feet. The angle towers are 46 feet in breadth above the bench. One of the medals shows only the ground floor with rustications. Those existing clearly prove that the ground floor formed one single mass of blocks as gigantic as those at the Pitti Palace at Florence. This building, and also Raphael's own palace, as well as the Palazzo Caffarelli built by Raphael, show that, unlike the Florentines—who towards the end of the fifteenth century gave up more and more their bold rustications—Bramante on the contrary chose this means of obtaining a greater impression of strength on the ground floor, and a contrast with the half-columns or pilasters of the upper storeys. Nevertheless, these means differ so much from the usual forms of Bramante that I do not feel sure as to the degree of "robustezza," as Italians would say, he intended to give to the other higher storeys, nor how far Bramante went in that direction. Whether it was he who gave the half-columns of the upper storeys rustic drums, or even alternatively round and square ones, as we see them, not always with taste and success, employed in buildings during the whole sixteenth century at Florence and Venice, at Milan, Bologna, and Verona; at the Luxembourg Palace in Paris; at York Stairs in London; and also in various designs\* and buildings of French architects,—is a question which at present I have not the courage to answer. I am sure but of one thing, that Bramante's incapacity of imagining and planning anything that did not display complete harmony would have impressed on this palace a character of might and strength, increased by the projecting five towers and their sky-lines, which explain why this monument, at once a Roman palace and a mediæval castle, was considered to be the finest example of Rustication. I believe it to have been one of the most powerful creations of modern architecture. We possess, besides the elevation, the plan of the whole palace, with numerous notes which seem to indicate an early design. The courtyard, square with five arcades on each side separated by piers with half columns, shows the same disposition, and is about the same size as that of the Farnese Palace, by one of Bramante's favourite pupils. The church in the centre of the rear portion of the palace was not finished according to Bramante's plan. A plan by Peruzzi, two others by Aristotile da Sangallo, and another one at Windsor,† give a pretty fair idea of what was executed, and of what may be obtained by restoration.

*Raphael's own Palace.*—The exact situation of this palace was established only a few years ago by Count Gnoli, as bordering the side of the Piazza Scossacavalli nearest St. Peter's; it is known by an engraving as well as by a sketch from Palladio, in the collection of the Duke of Devonshire. That the palace first belonged to Bramante is not certain, and so the belief that it was built by him and not designed by Raphael

\* Principally by the Du Cerceau family and Salomon de Brosse.—H. v. G. See *Les du Cerceau, leur vie et leur œuvre*, by the author of this Paper. 4o. Paris, 1887.

† At Windsor, in Her Majesty's collection, portfolio 12, No. 95, I noticed a drawing with the inscription, "Questo tempio e di Bramante d'e in Roma in Strada Giulia."—H. v. G. See the late Arthur Ashpitel's Paper on "Italian Architectural Drawings in the Royal Library at Windsor" in *TRANSACTIONS*, 1861-62, pp. 193-199.

himself is somewhat diminished. In Palladio's sketch,\* we understand that the coupled columns of the first floor on very firm pedestals, the angles formed by three columns, and the projecting entablature, in which the metopes above the windows were really open, gave that storey an appearance of strength quite in harmony with the enormous Rustication of the ground floor. Fine projecting balconies between the pedestals, and shields over the pediments of the windows, contributed to unite all the parts. The Palazzo Caffarelli, by Raphael, gives a very incomplete idea of that style, since by doubling its length the effect was totally taken away.

*The Santa Casa at Loreto.*—Among Bramante's works the Santa Casa at Loreto deserves a brief but special mention. It shows that one can make of a monument of small dimensions, by composition and order, and by beautiful mouldings, a work of great importance, of rich yet noble beauty. Among modern works of the Corinthian Order this white marble shrine deserves, no doubt, the first place. Besides this, Loreto is interesting on account of the Palace of the Canonica, forming in front of the church an imposing, although unfortunately unfinished, atrium, and because its Doric and Ionic arcades differ considerably in proportion from those of the Cortile di Belvedere, or those of the courtyard of the Loggie di Raffaello, without being less beautiful. Some designs, by Bramante's draughtsmen, give plans for the church façade, which differ from those shown on the commemorative medal. Finally, this church is interesting because it shows Bramante, contrary to what has often been said, as an ingenious constructor, who in a clever way knew how to consolidate the work of Giuliano da Sangallo, then threatened with ruin, without destroying its original character.†

#### THE ELEMENTS OF BRAMANTE'S SYSTEM—RULES, PROPORTIONS, AND NUMBERS.

Not having yet completed my researches, I am able to give but very incomplete information as to the theory of proportions which I believe Bramante employed. It is open to question whether he possessed anything like a complete theory. It is not unlikely that he had a collection of various rules, each containing a positive amount of truth, but not perhaps so connected as to form a complete or scientific theory of proportions. I have been able, nevertheless, to ascertain a certain number of facts which form, I believe, a valuable source of information, and which I shall briefly mention.

Bramante was acquainted with a series of different rules or systems of proportions‡ or harmony, from which he seems to have selected those he thought most appropriate to the character of the given problem. The rules I have hitherto met

\* This sketch is given in fac-simile in my book on *Raffaello studiato come Architetto*, Milan, 1884, p. 99; another one, p. 52.—H. v. G.

† Baron von Geymüller, though he refers in this Paper [p. 127] to Bramante's work at Santa Maria del Popolo, makes no mention here of the celebrated monument of Cardinal Ascanio Sforza, the elevation and details of which are given in the present volume [figs. 97–100] as illustrations to Mr. G. Simonds's Paper [pp. 201–204]. But the Baron, in his *Projets primitifs*, at p. 84 of the text, states that he considers the Sforza monument, if not a conception of Bramante, at least a work directly inspired by him, although Andrea Sansovino, who inscribed his own name upon the monument, executed it.

‡ In the *Annali della fabbrica della Cattedrale di Milano*, i. 68, 2nd May 1390, there is an allusion to the rules of proportion according to the triangle, and to another rule according to the square.—H. v. G.



with can be divided as to their nature thus:—(1) Rules or laws resting on arithmetical numbers forming progressions, or analogous to those constituting the base of harmony in music. (2) Rules of a more geometrical character, such as the mean proportion. (3) Rules derived by analogy from the proportions of the human body, considered to be the most perfect in creation, and from other living creatures, such as the horse, and therefore most likely to offer to Man suggestions as to the best way of obtaining in his compositions proportions leading to harmony and order. This was the object of those studies called “la quadratura dell’ uomo e del cavallo,” which Bramante also is known to have made with particular care. (4) Rules and laws derived from the *graphic experimental method*, consisting of a series of systematic combinations of the elements forming the more important problems the architect was likely to meet with, the result of which taught him which combinations were harmonious and which were not.\* (5) Laws of a more general character, more or less common to all arts, such as the laws of contrast, those of alternation and different sorts of equilibrium; the character of the horizontal and the vertical lines; the consequences of direction parallel or at right angles, &c.; and the artistic qualities inseparable from each of the regular figures—the triangle,† the square, the octagon, and the circle.

Some of these laws or rules rest on Vitruvius, who traced them back to Pythagoras and his school. Others, if we can trust Henszlmann’s studies, go back to ancient Egypt, were transmitted to Greece, Constantinople, and to the mediæval masters—and in fact never went out of use. For this reason, perhaps, books treating on the knowledge of the ancients on these questions may likewise lead to a better understanding of a question so important as this to architectural design. I therefore mention here those books I have hitherto met with on these subjects:—

Aurès (A.) *Nouvelle théorie du Module* (Nîmes, 1862), and other similar writings by the same author.

Babin (C.) *Note sur l’emploi des Triangles dans la mise en proportion des Monuments Grecs. Revue Archéologique*, 1890.

Barca (A.) *Saggio sopra il bello di Proporzione in Architettura*, 4o. Bassano, 1806.

Briseux ( ) *Traité du Beau essentiel dans les Arts appliqués surtout à l’Architecture. Suivi d’un Traité des proportions harmoniques*. Paris, 1752.

Choisy (A.) *Etudes Epigraphiques sur l’Architecture Grecque*. Paris, 1884. Rapports simples et échelle harmonique, pp. 31–38.

\* I have derived this belief from the following facts:—The Studies of L. da Vinci, forming what I called the “Trattato delle Cupole,” published in Dr. J. P. Richter’s *Literary Works of L. da Vinci*, vol. ii., fo. Lond. 1883; from a series of plans of which a fragment by Lorenzone da Siena is preserved amongst the drawings of the Uffizi at Florence; from other series I have met with in the course of my researches; and from a fragment of a treatise which I believe to be by Bramante.—H. v. G.

† In the *Annali della fabbrica della Cattedrale di Milano*, during the interesting disputes between Italian and French engineers in the year 1401, we find several allusions to those rules of the triangle. Vol. i. 227: “Questa variazione è lodevole perchè segue la ragione geometrica del triangolo . . . si rispetta il retto “ordine del triangolo . . . secondo la geometria triangolare . . . non si allontana dalla forma triangolare, dalla “quale nessun geometra perito non può nè deve recedere. . . .” P. 203, 25th Jan. 1400, they allude to ancients saying: “Aristotulus . . . dixit alibi omne corpus perfectum est in tribus, et motus ipsius et dictæ “ecclesiæ ascendit ad triangulum ut jam declaratum fuit per alios ingignerios.” Cesariano, in his edition of *Vitruvius* (Como, 1521), gives some of those triangles applied to Milan Cathedral. They had likewise been given, a few years before, in Fra Giocondo’s second edition of *Vitruvius*, Florence, 1513.—H. v. G.

- Hauk (G.) *Ueber die Stellung der Mathematik zur Kunst und Kunstwissenschaft. Preussische Jahrbücher*, 2<sup>tes</sup> Heft, August 1880.
- Hay (D. R.) *Natural Principles and Analogy of the Harmony of Form*. 4o. Edin. and Lond. 1842. *Proportion, or the Geometric principle of Beauty analysed*. 4o. Edin. and Lond. 1843. *First Principles of Symmetrical Beauty*. 8o. Lond. 1846.
- Lloyd (W. W.) *Memoir of the systems of proportion employed in the design of the Doric Temples at Phigaleia and Ægina* (in Professor Cockerell's *Jupiter Panhellenius*, &c. Fo. Lond. 1860.
- Pennethorne (J.) and Robinson (J.) *The Geometry and Optics of Ancient Architecture*. Fo. Lond. 1878.
- Penrose (F. C.) *An Investigation of the Principles of Athenian Architecture*. Fo. Lond. 1888.
- Saluzzo (C.) *Trattato di architettura civile e militare di Francesco di Giorgio Martini*. Turin, 1841.
- Schultz (W.) *Die Harmonie in der Baukunst, Nachweisung der Proportionalität in den Bauwerken des griechischen Alterthums*. 1. Theil, Mathematische Grundlagen des angewendeten Proportionirungssystems. 60 Holzschn. Hanover, Linden, 1891.
- Temanza (T.) 1762, . . . *della media proporzione armonica. Lettere pittoriche Bottari*. Milan 1822, V. 462-480.
- Viollet-Le-Duc (E. E.) *Dictionnaire raisonné de l'Architecture Française*, &c., vol. vii. p. 532 (art.: Proportion).
- Viollet-Le-Duc (E. E.) *Entretiens sur l'Architecture*, i. p. 385. Paris, 1863.
- Wulf (Eb.) *Architectonische Harmonielehre in ihren Grundzügen dargestellt*, in Försters's *Allgemeine Bauzeitung*, Vienna, 1874.

On the mean proportion I may mention the following books:—

- Fra Luca Paccioli. *Divina Proportione; die Lehre vom goldenen Schnitt*. Vienna, 1889. The original edition, Venice, 1509.
- Müntz (E.) *Histoire de l'Art pendant la Renaissance*, vol. ii. pp. 186-191. Paris, 1890.
- Pfeifer (Dr. F. X.) *Der goldene Schnitt in Mathematik, Natur und Kunst*. Augsburg, 1885.
- Zeysing. *Neue Lehre von den Proportionen des menschlichen Körpers*. Leipzig, 1854.

Your own TRANSACTIONS, Mr. President and Gentlemen, contain the following valuable contributions to the study of this important subject:—

- Bonomi (J.) *On the Greek Canon of the Proportions of the Human Figure*, quoted by *Vitruvius*, 1858-59, ix. p. 21, 29 Nov. 1858.
- Gwilt (J.) *Observations on the Heights of Entablatures*, 1842, ii. p. 123, 21 Jan. 1839.
- Hay (D. R.) *An Attempt to develop the principle which governs the proportions and curves of the Parthenon at Athens; with a few observations on the application of æsthetic science to Architecture generally*, 1852-53, iii. B.C. 7 Feb. 1853. *Extracts from a Paper on the Harmonic Law of Nature in the orthography of architectural design*, 1854-55, v. p. 1, 13 Nov. 1854.
- Henszlmann (Dr.) *Some remarks explanatory of a series of drawings illustrative of the alleged discovery of the constructional laws of mediæval church architecture*. 1852-53, iii. A.Y. 6 Dec. 1852. A committee, consisting of Sir Charles Barry, Messrs. Benj. Ferrey, George Gilbert Scott, J. J. Scoles, and C. C. Nelson, discussed Dr. Henszlmann's alleged discovery and reported thereon, 7 Feb. 1853.
- Lloyd (W. W.) *On the General Theory of Proportion in Architectural Design, and its exemplification in detail in the Parthenon*. 1858-59, ix. p. 129, 13 June 1859.
- Pennethorne (John). *The Connection between Ancient Art and the Ancient Geometry as illustrated by works of the Age of Pericles*. 1878-79, xxix. p. 105, 10 Feb. 1879.
- Thomas (W. C.) *Outlines of Metronomy, or the Science of Proportion*. 1868-69, xix. p. 183, 24 May 1869.



It is sometimes the fashion with artists and writers essentially modern to smile at ideas like these; and I am not of opinion for a single moment that blind, servile idolatry in such questions can lead to much good. I am, however, absolutely convinced that by studying the different applications of the laws of harmony and proportion as they exist in the forms and movements of the human body—which to our mind is the highest form of creation—the thinking architect will learn much. He will, thereby, gradually discern the reasons of harmony, and how he should proceed in his own works, in order to surely establish a richer consonance in an edifice, and concordance between its different parts. In this sense—and in this sense only—it is perfectly true that Bramante, in his plans for St. Peter's, partly took the human body as a model by introducing simultaneously into some of his designs various series of proportion. By choosing for the principal dimensions certain numbers, such as 600, 400, 216, 200, 100, 80, 60, 15, and 12,—which allow themselves to be divided in an exact way by the more elementary forms,—forming at least two series of multiples of the perfect numbers 6 and 10, one obtains richer effects of harmony. These are comparable with effects obtained in music by a *trio* or *quatuor* compared with a melody sung by a single voice. They are comparable also with the different yet harmonious proportions existing in the human body, different according as you take the palm, the foot, the cubit, the face, or the whole head, as your module or measure. By looking at these numbers and measures in some of Bramante's designs for St. Peter's, it will be clear to every one that he had a very strong faith in proportions.\* The use of paper ruled in squares adopted by Bramante for some of these designs, and which, as far as I know, is the earliest example of this method, proves likewise the importance he attached to making all the parts of his composition multiples of some fundamental measure or module. Very likely the conviction that harmony cannot exist without due respect for its fundamental rules, proportions, and numbers made Bramante adopt for the height of his nave and arcades bearing the cupola of St. Peter's the famous number 216,† which for a long time I had thought to be merely the result of the proportion of 1 : 2 applied to the width of the arcades; 103 palms, increased by a coefficient 10 in order to counterbalance the part of the vault hidden by the projection of the cornice to which it is very nearly equal.

Bramante was not only acquainted with several theories of proportion used by the Gothic architects, but he followed some of them in his designs for St. Peter's. This

\* *Les Projets Primitifs*, text pp. 153-155, 161, 163, 168, 173, 181-182, 198, 235-237, 251, 253, 270, 285, and among the plates more particularly plate 6, figs. 1-3, plate 22, figs. 1 and 6, and plate 12.—H. v. G.

† *Les Projets Primitifs*, plate 29, text pp. 235-236. About this number 216, Henszlmann, op. cit. p. 19, writes, "Le nombre 216 cité par Vitruve n'est autre chose que le nombre de tons contenus dans neuf octaves, et c'est justement par ce nombre 216 que nous apprenons l'étendue de la musique des anciens. Il n'y avait donc pas d'hérésie, ni chez Pythagore ni chez ses disciples, lorsqu'ils s'occupaient des rapports cubiques pour en tirer des proportions naturelles, soit pour la musique, soit pour l'architecture, soit en vue de l'harmonie générale. . . . Pythagore et ses disciples ne s'appuyaient donc pas sur le nombre 216 parce que c'est le cube du premier nombre parfait . . . mais parce que ce nombre embrassait tous les tons possibles dans la musique des anciens. . . . On explique en même temps pourquoi toutes mesures de parties importantes dans l'architecture des anciens sont contenues, comme nous le verrons, dans les limites de ces 216 termes ou dans ces neuf octaves."—H. v. G.

is evident from what he says concerning the proportions that ought to be given to the central tower of Milan Cathedral in comparison with those of the other parts of the edifice; \* and still more evident, I believe, from the fact that in the design D † he adopted for the proportions of the arches of the cupola to the diameter and height of the latter almost exactly those proposed in 1360 by Giovanni di Lapo Ghini for the cupola of the dome of Florence. I cannot believe that this fact, which proves the existence of a tradition of opinions and rules concerning such questions, and seems to confirm the opinion of Henszlmann, was the result of a mere coincidence.

In Ghini's model the measures were :—

Diameter of the cupola . . .	72 braccia.	Height of the arches . . .	72 braccia
Total height . . . . .			144 „

In the design D, Bramante's proportions were :—

Diameter of the cupola . . .	200 palms.	Height of the arches . . .	218 palms
Probable total height resulting from the comparison with other studies for St. Peter's, viz. twice that of the height of the arches . . .			436 „

There can be no doubt that on many points Bramante shared the opinions of his contemporaries—architects and painters—concerning the laws of harmony, and therefore it is useful to compare what those authors have written on such subjects with the proportions adopted by Bramante in his buildings or in his designs. The principal writers likely to give such information are Alberti, Francesco di Giorgio Martini, Fra Luca Paccioli, Cesare Cesariano (Bramante's pupil), in the commentaries to Vitruvius. ‡ Francesco di Giorgio speaks of the “*proporzioni delle sale*,” in chapter ix. of his second book; § chapter iii. of book iii., “*della origine e della proporzione delle colonne e dei pilastri*,” chapter iv., “*dei capitelli de' tre ordini*,” &c. In book iv., dedicated to the temples, chapter iii. treats of their proportions; chapter iv. proves that these are derived from those of Man, and alludes to the variety of opinions concerning this point, and examines two methods: one being to divide the total length in nine parts according to the face, another in seven parts. Chapter v. examines the proportion between the width and height of temples upon rectilinear plans, and explains at p. 231 that it is the width or diameter of the nave from which one takes the proportions of the other dimensions. In pl. 1, figs. 11, 12, and 13, Francesco di Giorgio gives different geometrical operations for obtaining the *modulo generale* for a building. In pl. 3, figs. 1–4, methods of obtaining the proportion of the height to the width of the nave of temples are given; in figs. 6–9, methods of obtaining the module of the proportions of a temple; in fig. 5 the proportions for the transverse section of a church with three naves; in fig. 10 the proportions of the human body compared with those of the plan of a church in the shape of a Latin cross.

I may also refer to the proportions of the principal buildings of Filippo di Ser

\* *Les Projets Primitifs*, text pp. 117, 181, plates 12 and 13.—H. v. G.

† *Ibid. Etude D*, Pl. 9–13.—H. v. G.

‡ *Vitruvius*, edition of Como, 1521.—H. v. G.

§ *Trattato di Architettura civile e militare di Francesco di Giorgio*—per cura del Cav. C. Saluzzo—Turin, 1841. 2 vols. in 4o. and Atlas in fo.—H. v. G.



Brunellesco in the monograph I published, from the measurements of the Società San Giorgio and of Herr C. von Stegmann, in *Architektur der Renaissance in Toscana*.\*

In compositions there are elements between which the eye forcibly establishes correlation, comparisons, and connections. Bramante knew that according to the proportions established between these elements the character of the composition, and the impression it will produce, must be different.

*Proportion of 1 : 2.*—By giving (in design D, referred to above) to all the degrees of arcades, which are elements of that sort, through or along which the eye had to run openings measuring 25, 50, 100, 200, based on the increase according to the constant proportion of 1 : 2, Bramante obtained not only a “mighty progression,” but a “harmonious crescendo” beginning at the entrance and leading to the central cupola. By giving also the same proportion to the length and width of the arms in this Greek Cross, and by fixing the height of all these arcades likewise after a proportion not very different from that proportion of 1 : 2, he was sure to obtain throughout the whole edifice quiet harmony, and make all these parts look as if belonging to the same body. Had some been tall and narrow, others broad and low, as in some modern churches in Paris, this would not have been the case. Had he chosen for his progression the ratio of 1 : 3 or that of the “mean proportion,” the effect would have been of another character.

*Proportion of 1 : 3.*—In the façade of the Cancelleria each storey may be said to be one-third part of the total height. In the Palazzo Giraud, on the contrary, which has also three storeys, there is a slight successive diminution in their height.

*Proportion of 1 : 6.*—I believe it cannot be considered as a mere accident that, in three at least of the plans for St. Peter's, the inner total length of the cross† is six times the inner width of the nave, and the height of the lowest Order is one-sixth of the total height; while some of its multiples also correspond with the principal divisions.

*Proportion of 1 : 8.* Design D, for St. Peter's. Pl. 12 [*Les Projets Primitifs*] gives the following:—

Width of the arcades of the nave and cupola . . . . .	100 palms	} 1 : 8
Total length of the arms of the Greek Cross . . . . .	800 „	
Tunnel vaults between the minor cupolas and the nave.		
Diameter of the columns and pilasters . . . . .	10 palms	} 1 : 8
Length of the vaults . . . . .	80 „	
Pl. 12, variante, Nos. 1 and 2, and fig. 2, pl. 15, and in the actual plan.		
Width of the pilasters . . . . .	10 palms	} 1 : 8
Length of the vaults . . . . .	80 „	

It will suffice to look at pl. 12† to be convinced that this repetition of the fundamental measure of the width of the nave is no accident but attained by deliberate intention. The number 80 occurs on pl. 15, fig. 7, as the width of the aisles, and on fig. 6 as the width of the extreme arcades of the nave and the arcades of the transept. When Bramante, in the study D, gave St. Peter's the total length and width of 800 palms, he arrived at that number evidently by following the idea expressed by

\* Munich, *Verlagsanstalt für Kunst und Wissenschaft*, vormals Friedrich Bruckmann.—H. v. G.

† *Les Projets Primitifs*, plate 12 and plate 15, fig. 8, 608 : 103 less 10 palms; plate 4, from door to door 708 + 6 + 6 : 120.—H. v. G.

Vitruvius in Book III., that edifices consecrated to divinity should offer proportions analogous to those of the human body.\*

Starting from the width of the nave, which, according to Henszlmann, had almost always been considered as the basis of the proportions of a temple, and assimilating this width to the height of the human head, he arrived accordingly to the proportion of eight heads for the total length to the number of 800 palms.† According to the drawings made by Signor Cola for the restoration of Santa Maria delle Grazie at Milan, the total height of the exterior would contain eight times the radius of the upper exterior part of the apses; and the greater number of these divisions correspond with the principal horizontal lines of the architecture.‡ Besides this we find here many other proportions harmonising on account of their common measure 1 : 1; five times 1 : 2; and also the proportions 1 : 3; 2 : 3; 1 : 4. Francesco di Giorgio's manuscript at the Magliabecchian Library at Florence, fol. 21, gives the drawing of a church façade in which some of the dimensions are shown by the divisions in eights of a human body having the total height of the church.

*Proportion of 1 : 10.*—In the façade of the Cancelleria Palace, the width of each of the projecting angles is exactly one-tenth of the total length of the front.

*Proportions developed by Contrasts of Form.*—Besides geometrical or arithmetical proportions in the exact sense of the word, there are proportions of another sort resulting merely from the similitude of the forms adopted. So in the Palace of the Cancelleria and the Giraud Palace—both with three storeys—besides the proportion of 1 : 3 existing between each storey and the total height, by treating the two upper storeys in a similar way Bramante not only established a contrast between the simpler ground floor, but introduced also the proportion of 1 : 2. In Raphael's own palace, with only two storeys, the architect, in order to avoid the monotony often resulting from simple repetition, expressed the contrast between horizontal strength (i.e. stability) and vertical strength in the coupled columns. Professor Aug. Thiersch, in his important study on Proportions in Architecture,§ proves—and I believe in many cases with reason—that one of the important laws is the constant proportion in general, and the similitude of figures, such as it is treated by Euclid in the Sixth Book.

#### THE ELEMENTS OF BRAMANTE'S SYSTEM—THE BRAMANTESQUE ORDERS.

The elements of Bramante's system are to be found in some Roman triumphal arches; in the interior of Leon Battista Alberti's church of Sant' Andrea at Mantua;

\* Francesco di Giorgio, ediz. Saluzzo, lib. iv. cap. ii. p. 224: "Ma essendo il tempio tutto un corpo "artificiale assomigliato in molte cose all' uomo, i medesimi membri suoi devono avere la medesima com- "mensurazione e non diversa."—H. v. G.

† The opinion of modern writers, given by E. Müntz, that Vitruvius and Lionardo da Vinci were mistaken in saying that the height of man is eight heads, and not seven and a half heads, even if it proved to be right, would alter nothing in the facts given here. See his *Histoire de l'Art pendant la Renaissance*, vol. ii. p. 188.—H. v. G.

‡ These proportions are not quite the same in the work of Cassina, *Le fabbriche più cospicue di Milano*; and at the present moment I am not able to say which is exact.—H. v. G.

§ *Handbuch der Architektur*, vol. iv. pp. 39–77. Darmstadt, 1883.—H. v. G.



and in the Sgraffito decoration of the Palazzo Newton at Pienza, generally attributed to Bernardo Rossellino, though the works of this master are so closely connected with Alberti that I have not yet been able clearly to establish what is his and what is Alberti's. But what seems to me to be one of the most important elements in Bramante's style, deserving a new name, is that figure for which I tried to find in German the expression of "rhythmische travée," and in French "la travée rythmique."\* At that time I was not aware that the word "rhythm" could also be applied to equal interspaces. Having however explained the difference of both systems to my friend Monsieur Charles Gounod, the maestro thought that the expression *Architecture rythmique* was specially qualified to characterise the results of the systematic use made by Bramante of the alternately broad and narrow interspace. It is largely by the systematic use of this method of composition, and the methodical development of nearly all its deductions and combinations, that Bramante deserves to be called "the Great Master of "Architecture." He did not invent it, but he was the first to raise it to a system; and by the genius he displayed in many varied and beautiful examples he founded an architectural system which has not yet been fully applied, which is yet incompletely known, and which I think deserves to be called after his name.

I must now invite attention to the different types of what, I believe, can be called Bramante's *Orders* or *Systems*

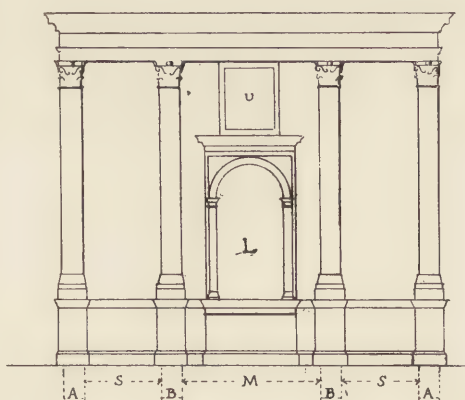


FIG. 38.—FIRST TYPE.

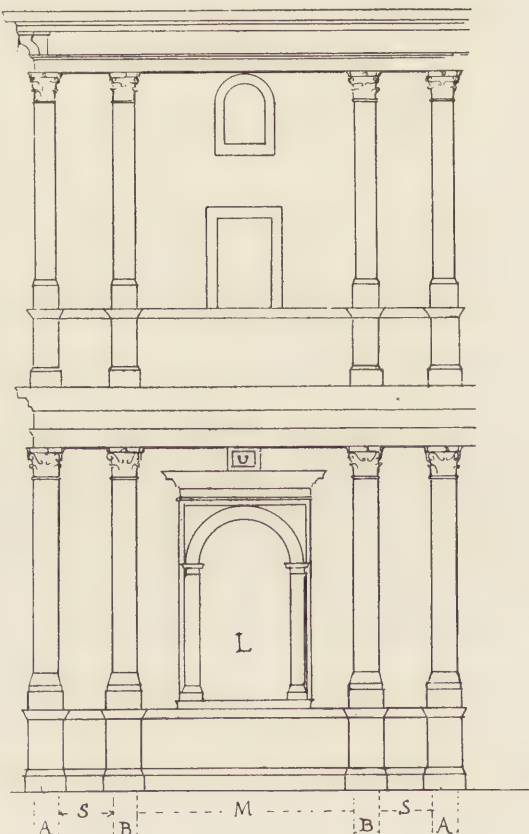


FIG. 39.—FIRST TYPE.

\* *Les Projets Primitifs*, pp. 23, 59, and 71. When I prepared that work I was far from seeing all the systematic developments of which this composition was capable. I gave some further details in the additions to the 5th edition of J. Burckhardt's *Cicerone*, pp. 48, 212, 222. Leipzig, 1884.—H. v. G.

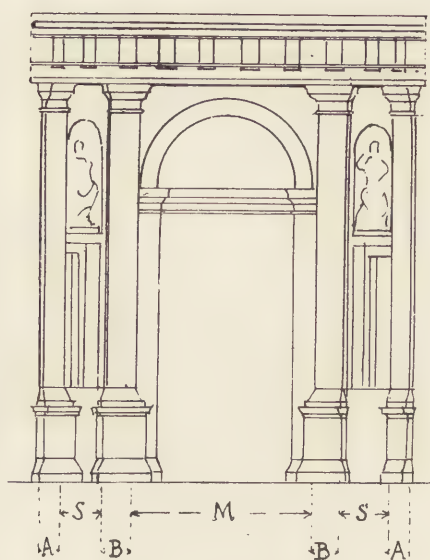


FIG. 40.—SECOND TYPE.

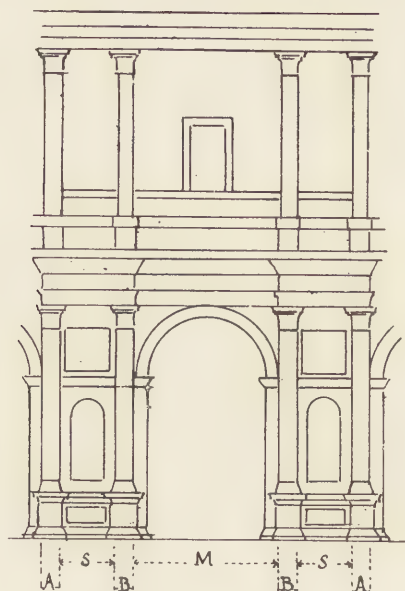


FIG. 41.—SECOND TYPE.

FIG. 42.—RESTORED DESIGN FOR THE SIDE ENTRANCES OF THE FRONT OF ST. PETER'S:  
BEING A DEVELOPMENT OF BRAMANTE'S SECOND TYPE.



[figs. 38-51]; and for the purpose of showing the connection between these types I have indicated by letters the corresponding parts in each example [figs. 38-43, 48-50], thus:—A A, the system of two outer supports. B B, the system of two inner supports. M, the middle or broad interspace. S S, the narrow or side interspaces. L, the lower "motive" in the middle interspace. U, the upper "motive" in the middle interspace.

*First Type.*—This is shown in the façades of the Palaces of the Cancelleria [fig. 38] and Giraud [fig. 39] at Rome—pilasters containing in the broad interspaces merely windows, and nothing in the narrow ones. It exhibits two variations, namely, (1) in the lower storey one single rich window surmounted either by medallions or rectangular tablets; (2) in the upper storey simple windows over which is a second range of round-headed smaller windows [fig. 39 upper storey].

*Second Type.*—Pilasters or half-columns which accompany arcades in the broad intervals, whilst the narrow spaces are coupled by intervening niches, tabernacles, or windows, and according to circumstances give rise to three variations. The examples are: the interior of San Pietro in Montorio [fig. 40]; the interior and the exterior in some studies for the façade\* of St. Peter's [figs. 42, 48, 49, 50]; and the now closed *loggia* of the Giardino di Belvedere at the Vatican [fig. 41].

*Third Type.*—This is obtained by letting the arch, in the central interspace, spring from above the entablature of the Order. We thus obtain what the French call the "motif à la Palladio." This arrangement, known to the ancients, reappears for the first time in the Renaissance, as far as I am aware, in two sketches in Bramante's album, which I recognised at the Soane Museum [fig. 43], and the first examples executed are likewise due to him, viz. in the Sala Regia at the Vatican, and in the choir of Santa Maria del Popolo, at Rome.



FIG. 43.—THIRD TYPE.

(From the sketches for Intarsia at the Soane Museum.)

*Fourth Type.*—This form is obtained by raising arches above the entablature, not only over the inner but also over the outer pair of pilasters, thus obtaining two concentric archivolts united by medallions, such as those described at Santa Maria presso San Satiro and Santa Maria delle Grazie at Milan [figs. 44, 45]. It was also executed by Bramante in his temporary choir [fig. 51] at St. Peter's, and attempts to introduce it into parts of the façade are found in the sketches.

\* *Les Projets Primitifs*, pl. 14; pl. 35, fig. 2; pl. 36, fig. 1.—H. v. G.

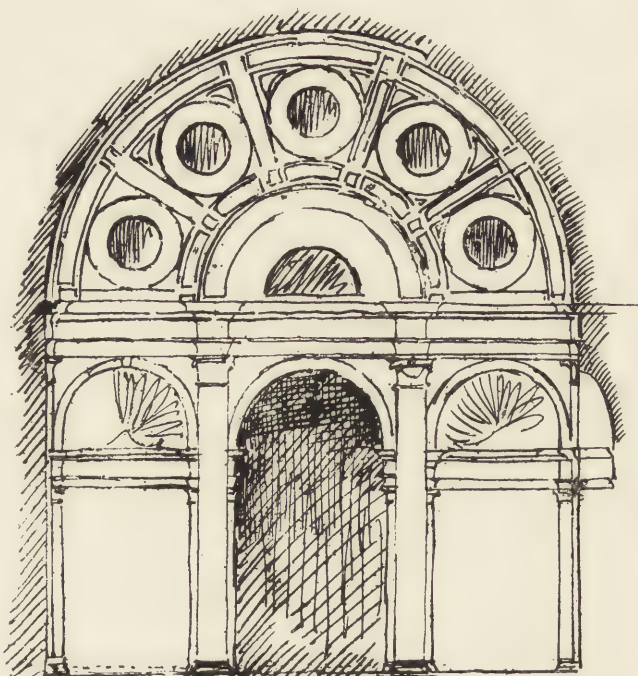


FIG. 44.—SANTA MARIA PRESSO SAN SATIRO, MILAN.

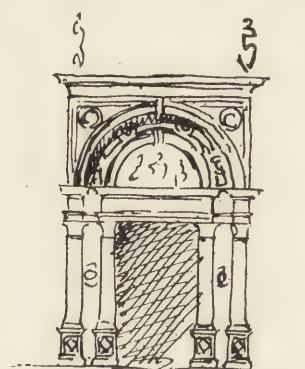
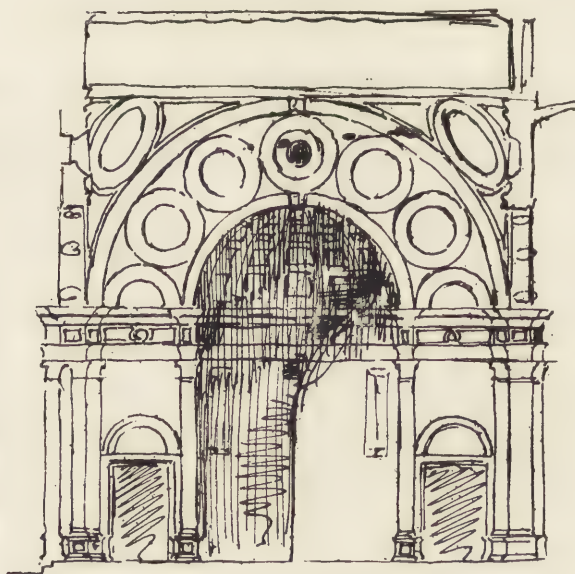
FIG. 47.—SANTA MARIA DI PIAZZA  
BUSTO ARSIZIO.

FIG. 45.—SANTA MARIA DELLE GRAZIE, MILAN.

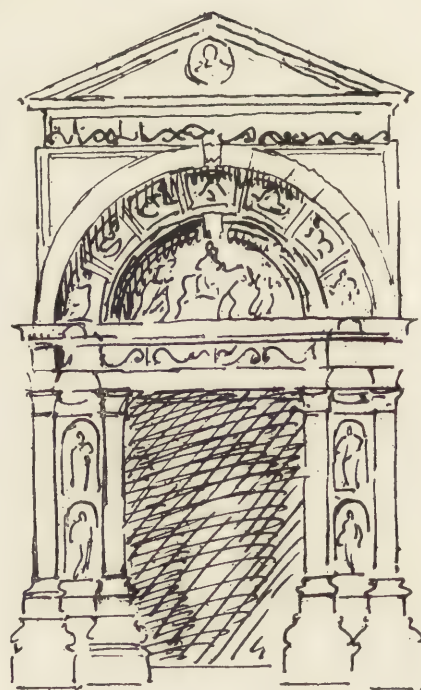
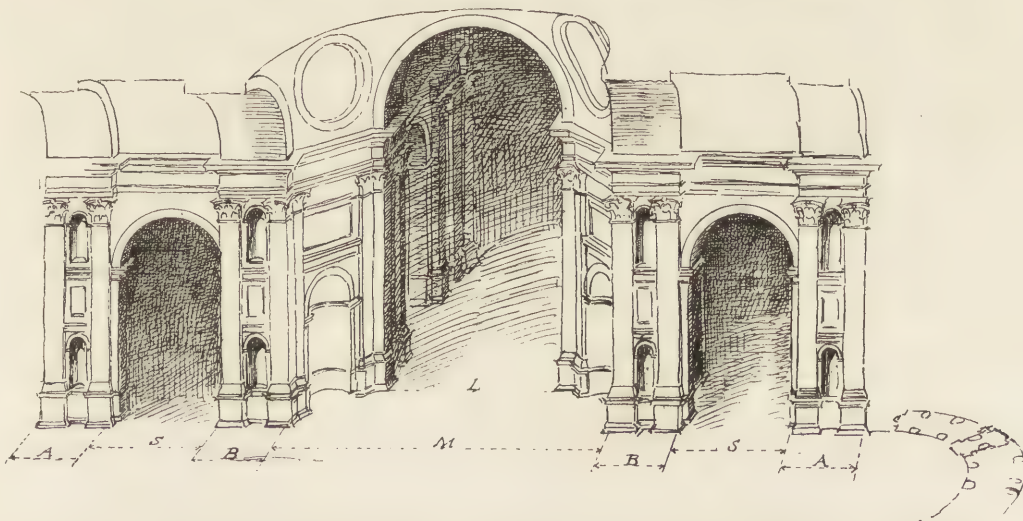
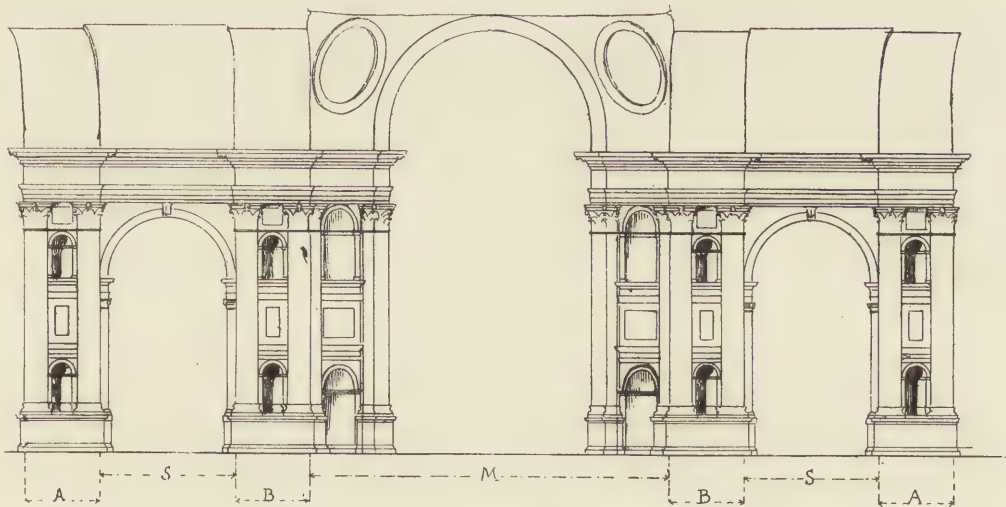


FIG. 46.—COMO CATHEDRAL.

FOURTH TYPE.





FIGS. 48 AND 49.—THE TRIUMPHAL ARCHES OF ST. PETER'S: SECOND AND THIRD TYPES COMBINED.

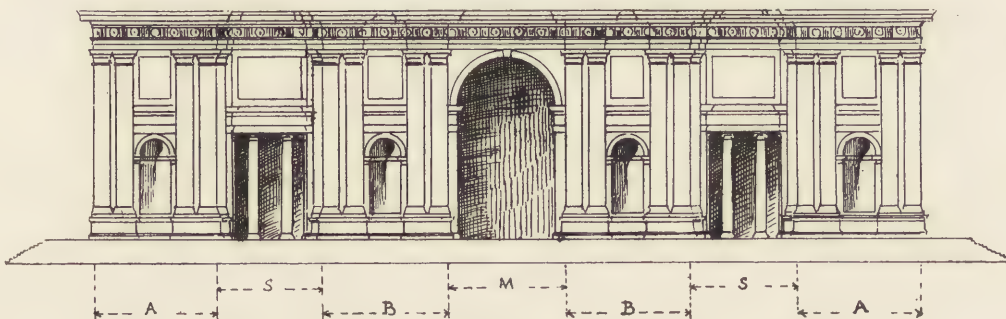


FIG. 50.—STUDY FOR THE FRONT OF ST. PETER'S: DEVELOPMENT OF THE SECOND TYPE.

*Developments.*—According to circumstances the second system can become the frame for two Orders of different height, or even three; and also by combining the narrow intervals it can receive two storeys or windows [fig. 42]. In some cases the four pilasters of the tall Order, instead of being single, are coupled, and thus reach the number 8;\* or only the pilasters at the extremity are coupled, thus being only 6.† The third type applied to Bramante's system of St. Peter's leads to each of his four triumphal arches with three arcades [figs. 48, 49], which form the wonderful principal feature of St. Peter's inside and bear the cupola, where the pilasters are no longer simply coupled but have each become a richer system—a repetition of the

primitive narrow intervals, i.e. two pilasters coupled with intervening niches. Bramante's door of Como Cathedral [figs. 33, 46] and the door of Santa Maria di Piazza at Busto Arsizio—thought to be one of his designs [fig. 47]—likewise belong to this type.

It is impossible for me to dwell on or even mention here all the different combinations and developments of which this system is capable. Its merit seems to me to consist principally in giving more life and elasticity to the forms, first by forcing the eye to be more active in successively passing from narrow to broad interspaces; and secondly, in the two latter types by harmoniously blending the contrast of the two systems of covering—the horizontal and the semicircular. The narrower interspaces with their horizontal covering unite in letting the archivolts really spring over the broader central interspace. When the piers seem broader than the arch, as is the case in the dome of Florence and the Arc de l'Etoile

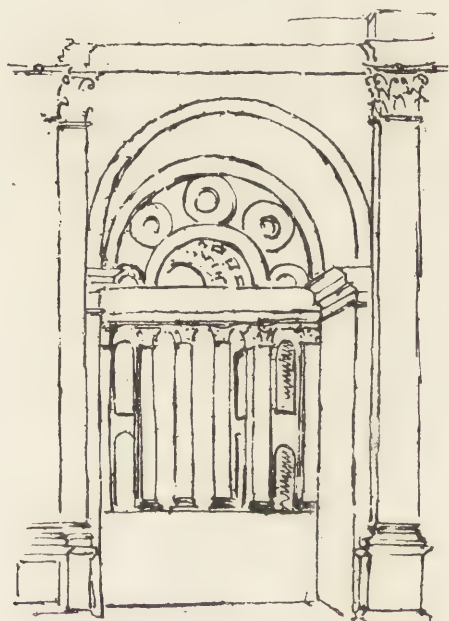


FIG. 51.—WINDOW IN BRAMANTE'S TEMPORARY CHOIR AT ST. PETER'S.

SECOND AND FOURTH TYPES COMBINED.

of Paris, all boldness is taken away from what is meant to be the most interesting part of the composition.

Permit me, in concluding this part of my subject, to express a belief that the best rules of proportion can only be of slight use to the architect if he does not perfectly understand why such laws exist, or rather what is their exact meaning—if he does not feel in his heart what the character of those proportions is,—and what æsthetic or artistic impressions, instinctively intelligible to common sense and universal feeling, belong to the geometrical forms we use. Vasari was evidently

\* *Les Projets Primitifs*, plate 31, fig. 2; plate 30, left half; plate 37; plate 38, fig. 2. † *Ibid.* plate 30, right half; plate 36, fig. 1; plate 39, fig. 5.—H. v. G.



right when he said, in his letter to Martino Bassi,\* that though an object will answer to the rules and be approved by the most experienced, yet if it offend the eye it will never be approved of. The saying of Michelangelo which he quotes—that one must have the compass in the eye and not in the hand, *i.e.* judgment, and that for this reason he used sometimes figures 12 or 13 heads high according to their altitude, and so likewise employed his columns and other members, striving always more after grace than measure—contains a very great, but only very partial, truth. Even Michelangelo, by consulting nothing but his own feeling, greatly sinned in more than one case against harmony and good taste—in the apses of St. Peter's, for instance. In these matters, as well as in every other human action, the truth lies in a loving union of subjective liberty with objective respect for law.

BRAMANTE'S DIRECT AND INDIRECT SCHOOLS IN ITALY.

*His Milanese School.*—Many works of DOLCEBUONO, CRISTOFORO SOLARI, TOMMASSO RODARI, and CRISTOFORO ROCCHI reveal the influence of Bramante's buildings: particularly the choir of Como Cathedral, the church of Santa Maria presso San Celso, and the church of San Magno at Legnano; and beyond the frontiers of Italy—at Chambord, for instance—the eye well acquainted with Milanese art will easily detect in many a cornice and capital the chisel of sculptors who had worked under Bramante and Caradosso. It is impossible not to think in looking at the numerous studies of LIONARDO DA VINCI for a treatise on cupolas that he did not in more than one instance reflect some idea of Bramante. For sixteen or seventeen years they lived side by side; both bore the title of “Ducal Engineer and Painter,” and it seems impossible that two men of such powerful genius should not learn from each other. A few lines written by Lionardo, with the title of “Edifici di Bramante,” seem to allude to a regret at their not having been finished.

*His Roman School.*—The influence of Bramante's designs for St. Peter's is manifest in one way or another in each of the eight or nine studies that GIULIANO DA SANGALLO (in the year 1516, shortly before his death) made for the façade of San Lorenzo at Florence, during the competition undertaken by order of Leo X. Bramante's influence on MICHELANGELO is manifest, at the very same moment, in each of the five or six studies by that great master for the façade of the same church at Florence, in the adoption of Bramante's system of columns at alternatively distant and close intervals, the latter combined with niches. Moreover, in later years Michelangelo wrote to a friend that, at St. Peter's, he considered himself only as the executor of Bramante; but, unfortunately for us, Michelangelo was far from being that, although no doubt sincere in the belief that he was so. As regards the influence of Bramante on the architects of the subsequent generations, I need but

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\* *Dispareri in materia di Architettura ed prospettiva di Martino Bassi*, 1572, p. 47. — H. v. G.

recall what I have written of his teaching to RAPHAEL, and add that practically one may admit that their intercourse was constant.

ANTONIO DA SANGALLO, the *elder* brother of Giuliano da Sangallo, showed in his Greek Cross church at Montepulciano, and in the palace of Cardinal del Monte at Monte Sansavino, that he admired the works of Bramante's last manner.

BACCIO D'AGNOLO, in the Doric capitals of the Bartolini Palace at Florence, and those of the villa built in the Via Valfonda by the same architect, showed how much he admired those of Bramante in the courtyard of the Cancelleria.

PERUZZI was one of Bramante's draughtsmen whilst planning St. Peter's [fig. 52],

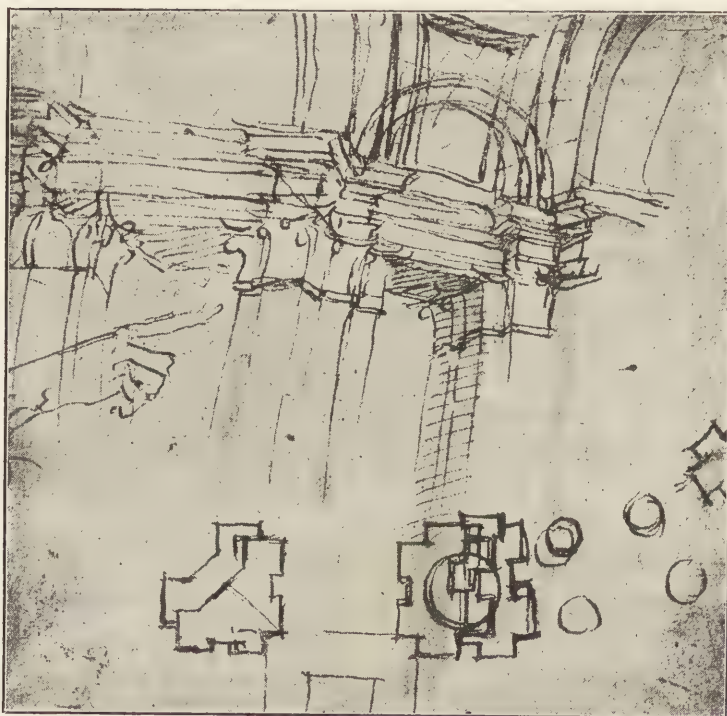


FIG. 52.—EARLY STUDY FOR ST. PETER'S, MADE BY PERUZZI FOR BRAMANTE, WHO SKETCHED THE HAND POINTING AT SOME PREFERRED SOLUTION.

and his several designs for San Domenico at Siena, preserved at the Uffizi, show each a reduction of some of Bramante's ideas for St. Peter's; likewise many parts of his design for completing San Petronio at Bologna, as well as the cathedral of Carpi, were largely due to his master's early influence.

ANTONIO DA SANGALLO the younger, for a considerable time draughtsman and assistant of Bramante, when gout rendered his old hand trem-

bling, gives in his Church of Santa Maria di Loreto, in the Piazza Trajana, Rome, an early echo of some parts of the designs for St. Peter's; and the design of the beautiful court of the Farnese Palace is certainly not very far from that of his master for the courtyard of the San Biagio Palace.

JACOPO SANSOVINO, in his unfinished *loggia* at the foot of the campanile of St. Mark's, partly reproduces a "motivo Bramantesco," and those of his palaces at Venice which show columns on a rusticated ground-floor, are in some way connected with the work of his master.

PALLADIO (lib. iv. p. 64) writes about Bramante in the following strain: "Architecture at the time of our fathers and forefathers, emerging from the darkness in



"which it had been a long time as it were buried, became once more presentable in the light of the world. Wherefore, under Julius II., Bramante, a very excellent man and an observer of the ancients, made beautiful buildings in Rome" [he says nothing of those in Lombardy, no doubt because they were not sufficiently antique in his eyes]; "and after him followed Michelangelo Buonarroti . . ." And further on he writes: "Bramante was the first to bring to light the good and fine architecture of the ancients, which until that time had been hidden. . . ." Some drawings of Palladio, made in his younger days, and preserved in the Collection (Portfolio No. V.) of the Duke of Devonshire, show that his method of sketching at that time was very similar to that of Raphael, *i.e.* the one prevalent with the pupils of Bramante.

If Bramante's *tempietto* in the Cloister of San Pietro in Montorio was the only modern building Palladio published as worthy to stand among those of the ancients, several sketches in the Devonshire Collection show that he studied other buildings of Bramante, or of his favourite pupil, Raphael. For instance, the latter's own palace (reproduced in my *Raffaello studiato come Architetto*, p. 99) and another drawing is either inspired from Bramante's Cortile di Belvedere, or from one of his designs for some other part of the Pope's palace. Another sketch, even if it were partly inspired by the famous round courtyard of Vignola at Caprarola, is practically due to Bramante, because every part of it belongs to his *ultima maniera*. A plan in Portfolio XV. of the Devonshire Collection is taken from one of the towers for St. Peter's.

Even the "motif à la Palladio," as the French call it, which was, however, known to the ancients, was first re-introduced into architecture by Bramante, both in the choir of Santa Maria del Popolo and the Sala Regia at the Vatican. Moreover, Palladio, besides the personal study of Bramante's works at Rome, lived at Vicenza, where he was almost besieged, so to speak, by GIULIO ROMANO of Mantua, JACOPO SANSOVINO of Venice, and MICHELE SANMICHELI of Verona and Venice. The two former were true pupils of Bramante's last manner, and the latter most likely so too, particularly as regards style. From these three men, no doubt personally known to him, Palladio was able to get information about Bramante's buildings, lost to us, or at least not yet traced back to him.

Let me add a reference to works standing likewise to some extent under the influence of Bramante: the background in Busti's Pala di Marmo, in the "Chapel of the Presentation" in Milan Cathedral; the ground-storey of the courtyard in the Crispi Palace at Ferrara (such was its name in 1826, as shown in a sketch by Abel Blouet at the Ecole des Beaux-Arts); the gallery of marbles at the Ducal Palace at Mantua—all these show a combination of both Bramante's favourite motives of rhythmic arrangement.

#### THE EXPANSION OF BRAMANTE'S INDIRECT SCHOOL IN EUROPE.

*Spain.*—At an earlier period in Spain some architects experienced the influence, if not always of Bramante direct, at least of his satellites in Lombardy. Some outer parts of the cathedral at Seville, near the Giralda, remind one a little of the cathedral

of Como. At Toledo the entrance to the Hospital of Santa Cruz and its two adjacent

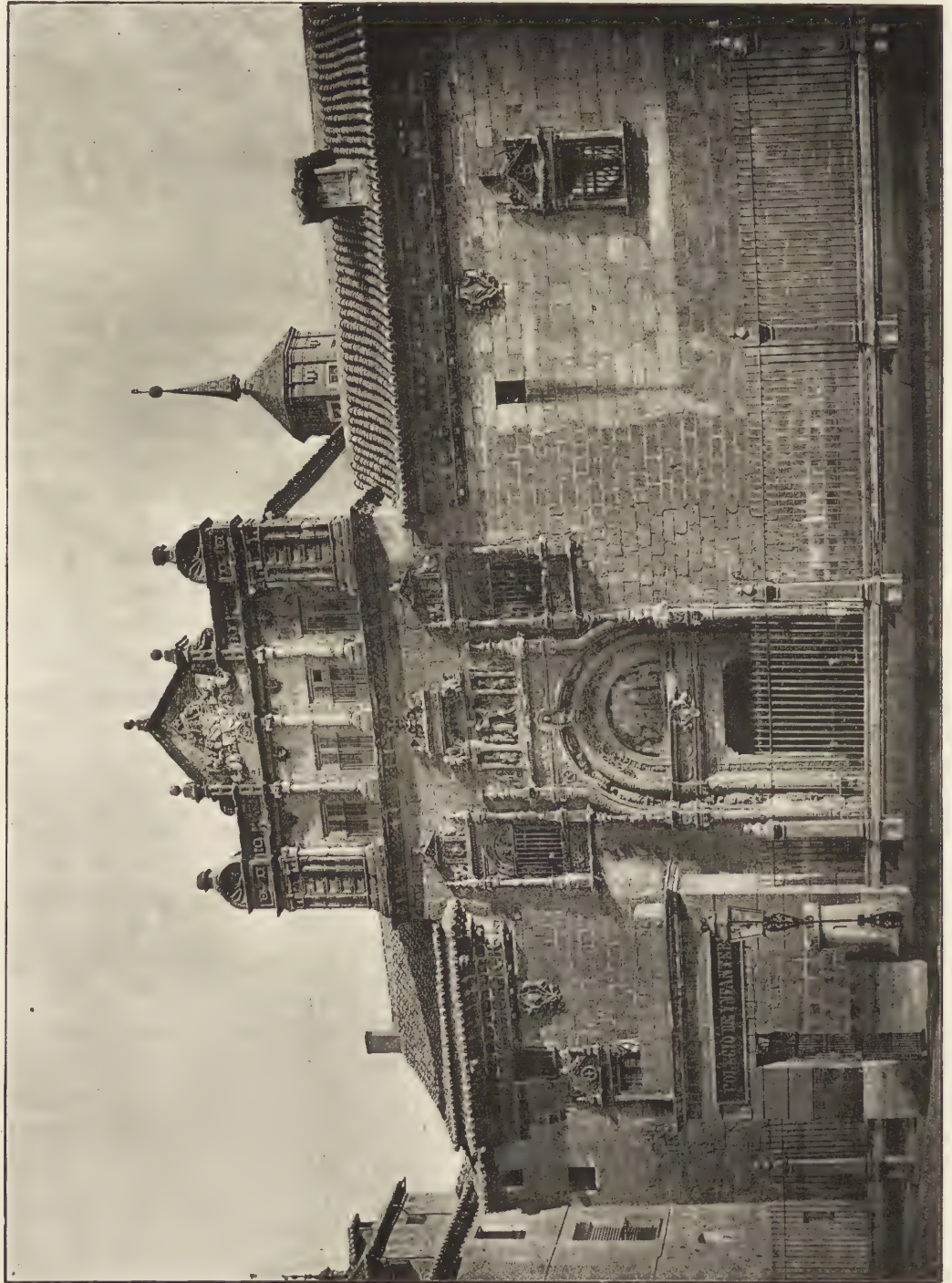


FIG. 53 — TOLEDO : HOSPITAL OF SANTA CRUZ. INFLUENCE OF PARTS OF COMO CATHEDRAL. (From a photograph.)

windows [fig. 53] are undoubtedly brilliant variations of the Porta della Rana and the



monuments of Pliny at Como; and the ancient parts of the town hall at Seville [fig. 54] show some Bramantesque motives, but clad in the overwhelming richness of the

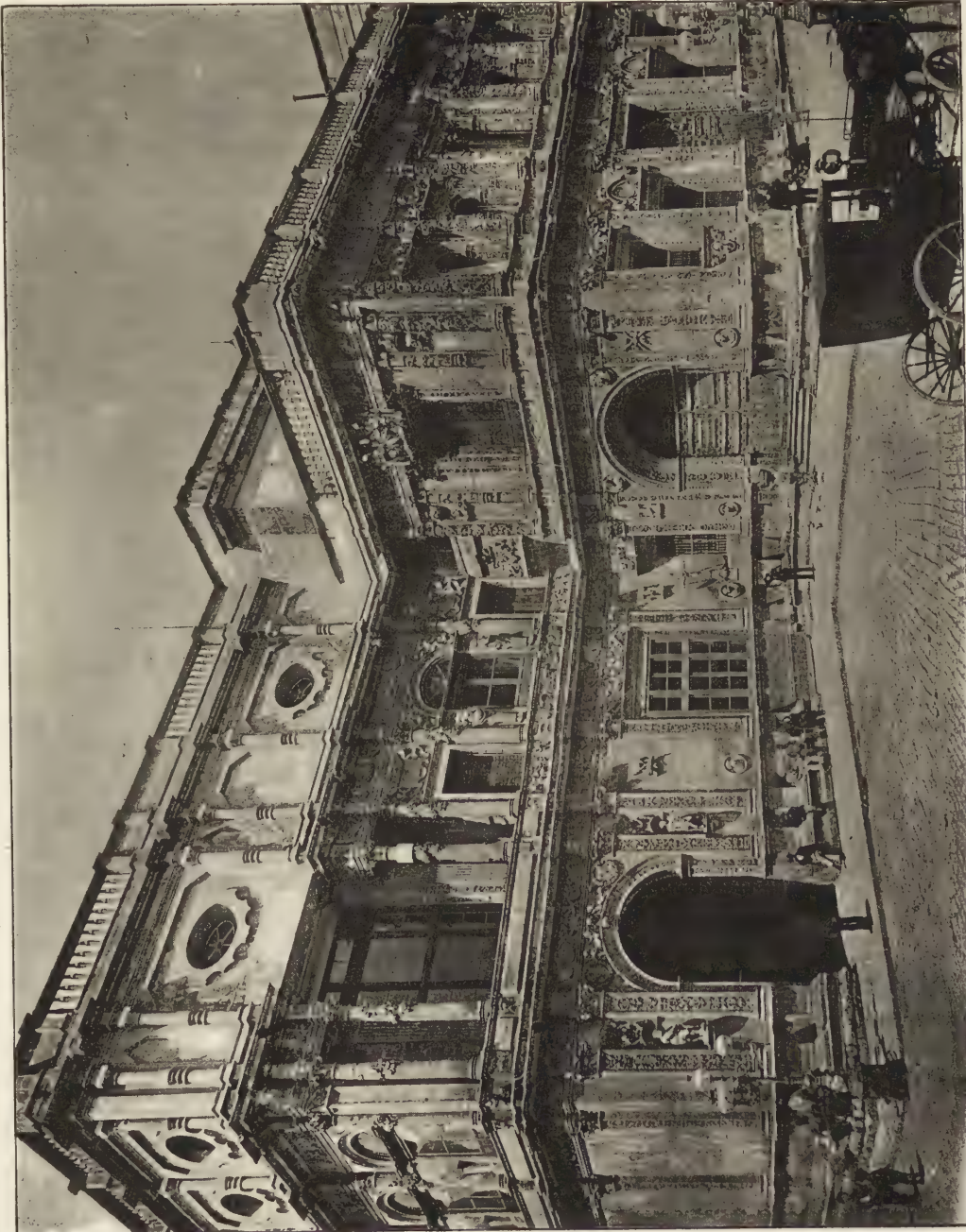


FIG. 54.—SEVILLE: OLDER PORTIONS OF THE TOWN HALL. INFLUENCE OF BRAMANTE'S MILANESE SCHOOL. (From a photograph.)

Certosa di Pavia and the town hall at Brescia. The monument of Catherine Ribera in the Temple of the University at Seville to a certain extent, and the palace of

Charles V. at the Alhambra in several places, show that the authors of these monuments were acquainted with the designs and studies for St. Peter's; the proportions of the Orders of the Circular Court remind one strongly of those of Bramante's pupil, Jacopo Sansovino, at the University of Padua. In the same town of Granada, the tower of the cathedral comes in direct line from the towers in the designs for St. Peter's. The tower of the cathedral at Malaga is derived from other designs for the towers of the same monument, and those of the church at the Escorial to a far less degree; but here the cupola in its drum is entirely his *ultima maniera*, and, like that of the Madonna di Carignano, comes from one of the earliest studies for St. Peter's.

*Portugal.*—The interior of the choir of Belem is certainly like the choir of Como Cathedral, which was influenced by one of the designs for St. Peter's, as far at least as the interior is concerned. The cloister of Philip II. at Thomar in all its parts reveals certainly a direct or indirect connection with Bramante's *ultima maniera*; it is a development of his studies for the Vatican, if not the repetition of an unexecuted design for some part of the Papal Palace.

*Germany.*—Though I have made no systematic researches, I may mention the entrance to the ancient chapel of the Castle at Dresden, bearing the date of 1555, as a reproduction of the second Bramantesque type; its author belongs to Bramante's school of St. Peter's.\* At the Louvre there exist drawings by a German who, in 1515 and 1516, was in Italy and adopted the Italian way of drawing architecture; he seems to belong to the family of the sculptor Peter Vischer at Nuremberg, and one sketch shows an attempt to translate the monument of St. Sebald into forms of the school of Bramante.† Not only in a general way are the architectural backgrounds of the decorative compositions of Hans Holbein the younger derived from the *Stile Bramantesco*—of which they can be considered as a translation into German—but in several cases it is certain that Holbein copied capitals of Bramante, which can be seen by one of his drawings at the Museum of Bâle. A fine drawing, belonging to the Duke of Devonshire,‡ shows in the capitals likewise a thorough knowledge of the Bramante capitals at Milan.

*Switzerland.*—Numerous Swiss fountains are adorned with a central column, the capitals of which are often derived in direct line from some of Bramante's buildings in Lombardy: as, for instance, the Samaritan Fountain at Fribourg, erected in 1544; and, in the same city, the chapel of Santa Casa is a distant but evident imitation of Bramante's celebrated one at Loreto.

*France.*—In French buildings and designs for them we meet with numerous recollections of Bramante's last manner, such, for instance, as the circular Sépulture des Valois, formerly existing at Saint-Denis. Jean Bullant's entrance to the Château

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\* Fritsch, *Deutsche Renaissance*, 1st fascicolo.—H. v. G.

† Some of these drawings have been published, since my Paper was read, as the work of Hermann Vischer, in the *Jahrbuch der Königl. Preuss. Kunstsammlungen*, 1891, 1st fascicolo.—H. v. G.

‡ Published by Woltmann in his *Hans Holbein*, and in the *Gazette des Beaux-Arts*, 1869, p. 432.—H. v. G.



d'Ecouen is another instance. In some way also Philibert Delorme's entrance to the Château d'Anet, and the projecting pavilions in Pierre Lescot's courtyard of the Louvre, are derived from Bramante's towers for St. Peter's. The two storeys of the fine court of the Château de Bournazel (Aveyron) [exhibited in the Salon of 1891 by M. Dausset], the side entrance to Saint-Nicolas at Troyes, the right tower of the façade of the principal church at Gisors, the doorway of the Château de la Tour d'Aigue, in the south of France—the last inspired from the centre of a façade designed for St. Peter's—belong to the same Order. Whenever you meet with pilasters or columns spaced alternatively wide and narrow, combined with niches, as in parts of the Cour de la Fontaine at Fontainebleau, you are in presence of one of the combinations Bramante reduced to a systematic Order. Other examples can be seen in the part of the Tuileries decorated with great composite pilasters, though not very successfully; and again, though to an extremely small scale, and half expressed in Gothic details, in the row of niches crowning the baldachin over Cardinal d'Amboise's tomb in Rouen Cathedral. The entrance to the Château de Verneuil is another example; and all those numerous examples to which I alluded in my book on the Du Cerceau family show that Androuet du Cerceau had evidently seen and studied drawings of Bramante now lost to us.

*England.*—I regret my inability at present to treat fully of a Bramante influence which was probably felt in England. Sir Christopher Wren, by studying—no doubt in the third book of Serlio—the plan of Bramante's cupola,\* notwithstanding its incorrect representation there, imparted to the drum of St. Paul's, in its external part, a beauty which is far more Bramantesque than is that of Michelangelo's cupola, thus giving a clear proof of his powerful genius; and through Palladio more than one example of Bramante's last manner can be cited—as for instance the noble front of Somerset House towards the Strand.

There probably existed only two ways by which a new style of architecture spread beyond the country of its birth; in the case of the Renaissance these would be by Italian architects going abroad to teach, and by foreign students coming to Italy to learn, the new forms. The Renaissance expanded beyond its native cradle first into the different parts of Italy by Tuscan artists (who had learnt at Rome) going to Milan, Padua, Venice, Rome, Rimini, and Urbino, and at the same time by Lombards and other Italians visiting Florence or Siena besides. Then the Tuscan style, having become Italian, was spread over Europe by Italians going abroad, as well as by French, German, Spanish, and Flemish artists going to study in Italy.

Geographical situation, as well as the conquest of the Duchy of Milan by Louis XII. and François I., naturally led to the French first getting acquainted with Renaissance architecture under its Milanese form—the *Stile Bramantesco*, as it is called there. Thus the *Styles Louis Douze* and *François Premier* are daughters of the Milanese.

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\* Serlio, Book 3, pp. xxxvi.—xl. Venice, 1551.

The loss of that beautiful duchy, as well as the growing fame of Bramante's designs for St. Peter's, the Vatican, and later works, then caused the succeeding generation of French artists to go to Rome, where they became acquainted with some of Bramante's famous buildings; also with his pupils, the three or four Sangallos of the younger generations; with Baldassare Peruzzi, and with both the Sansovinos and Sanmicheli, whom later they could meet at Venice. Besides the models for his buildings, they saw in the hands of those pupils and their numerous draughtsmen sketches and copies of innumerable studies by Bramante, whose mind had never been at rest but always brimful of beautiful ideas. Indeed, I think I may say that from the year 1503 or 1506, when the designs for the Pope's Palace and St. Peter's were made, until the end of the Renaissance, the designs and studies of all architects reveal, in some way or another, the influence of Bramante, or they contain important elements from some of his works. In this respect many of the engravings and drawings of Jacques Androuet du Cerceau which will be found in my book\* happen to be particularly instructive. The only fragment of his studies in Italy, known at present, is contained in those fourteen leaves preserved at Munich, which consist of sixty-one sketches. Forty of them are taken from Bramante's models and designs for St. Peter's, not executed; nine are from buildings by Raphael and A. da Sangallo, and the remaining twelve from the antique edifices.

Amongst the elements which contributed to the propagation of certain details of Bramante's work are the engravings, medals, and small bronze reliefs called in French *plaquettes*—such, for instance, as the figures of a plaquette representing two satyrs and a sleeping woman, reproduced on the frieze of a door at Valence, near Lyons, called Maison Dupré-Latour. Moreover, in Italy we hear of Michelangelo copying a certain engraving of Martin Schoen, and Andrea del Sarto copying two figures by Albert Dürer; and, once at least, Dürer took a figure from a Mantegnesque print. In the Château de la Bastie d'Urfé are several of the *Thermes* engraved by Agostino Veneziano, reproduced in painting and relief, as can be seen in the Monograph† published by Count de Soultrait and F. Thiollier.

#### METHODS OF INSTRUCTION AT THE RENAISSANCE.

*Drawings and Models.*—I do not propose to say anything here of the practical instruction acquired by working in the shop of some mason, carpenter, sculptor, or goldsmith, and will, therefore, only give a few indications as to the less technic means of instruction in Italy, during the sixteenth century.

There can be no doubt that the study and measuring of the ancient monuments was considered as of the greatest importance. All those who could afford it composed for themselves in that way, or in copying the studies made by others, a

\* *Les Du Cerceau*, pp. 7-27, 71; and figs. 17, 28, 29-30, 59, 87-89, 93, &c.—H. v. G.

† St. Etienne, 1886—Société de la Diana, and the Society's volume for 1890.—H. v. G.



book or collection of antique monuments—a “*Libro delle Antichità*,” such as the two extant by Giuliano da Sangallo, the one by Bramantino, the fragments by Fra Giocondo,\* and those of many other masters, known and unknown, which are preserved in the numerous libraries of Europe. Pupils were made to copy their master’s drawings in facsimile. This seems to me the only way of accounting for the copies extant of Raphael’s sketch of the door of the Pantheon, in which even the manuscript notes of Raphael are copied as like as possible, and in the same place as on the original at Florence. One copy is also at Florence; and another very similar is in the Soane Museum, London. The style of execution shows that they were done during Raphael’s lifetime, and the first very probably in his studio. At Windsor (Portfolio XVI., No. 21 and following) are certain drawings after those of Giuliano da Sangallo’s famous Codex at the Barberini Library at Rome. Among the drawings at Lille erroneously † attributed to Michelangelo at least one drawing is taken from Bramantino’s sketch-book in the Ambrosiana at Milan, or if not both must have been taken from the same original drawing. Naturally, as has always been the case, pupils helped their masters in many drawings made for them. On some of the Palladio drawings in the Devonshire Collection the handwriting of his pupil Scamozzi can be recognised with tolerable certainty.‡

The Renaissance architects studied not only executed buildings and drawings; they also studied wooden models designed for execution. At Milan and Munich there are studies of Aristotile da Sangallo, after the wooden model of Michelangelo for the façade of San Lorenzo, Florence. At Florence and Paris I know of drawings taken from the same wooden model; whilst at Florence, Lille, Munich, and Rugby there are drawings by Aristotile da Sangallo taken from the “*primo disegno che fece Michelangelo per San Lorenzo*.” I have also described drawings of Du Cerceau existing at Munich, which were taken from Bramante’s model for St. Peter’s. The drawing at Rugby belonged formerly to Sir T. Lawrence, who most likely bought it from Wicar, the same painter of Lille who left drawings to the museum of his native city, as being originals by Michelangelo. The drawing at Rugby was, in fact, considered there to be an original Buonarroti, and has been published as such by Professor Schmarsow in the *Jahrbuch der königlich Preussischen Kunstsammlungen*, 1889. Unfortunately I was obliged to recognise it to be a copy by Aristotile da Sangallo.

*The Workshop, Fabric, and Academy.*—In other instances artists received their professional instruction on the works of some large cathedral. Under date 8th January 1400 we find an interesting letter from the Duke of Milan, ordering that the young Filippino da Modena, son of one of the Ducal Engineers, should be received on the works of Milan Cathedral; the engineers of the fabric were to teach him everything, in order that he should progress, and a salary sufficient for him to live upon

\* See the author’s pamphlets *Cento disegni di Fra Giocondo*, Florence, Bocca, 1882; and “*Trois Albums de Dessins de Fra Giocondo*,” from the Destailleur Collection at Paris, in the *Mélanges d’Archéologie et d’Histoire*, published by l’École Française de Rome, 1891.—H. v. G.

† I discovered them to be by Antonio da Sangallo’s brother, Battista, called the “Gobbo,” and by their cousin Bastiano, called Aristotile da Sangallo.—H. v. G.

‡ Portfolios V., X., and XXII.; one taken from the Roman remains of Spalato, XIII. and XIV.—H. v. G.

was to be given to him.\* Under date 11th January 1405 Antonio da Paderno was appointed for eight years one of the Engineers of the Fabric, with the obligation to instruct all those who should be recommended to him by the deputies of the Fabric.† On the 22nd June 1515 the "opera del duomo" (that is to say, the *œuvre* or fabric of the cathedral) at Siena entrusted Giovannantonio Bazzi, called Sodoma, with the duty of gratuitously teaching everything connected with Art to four children chosen by the administration.‡ A similar duty had also belonged to the sculptor Antonio Federighi, and then to Ventura di Ser Giuliano Turi de' Pilli, wood carver and architect; and finally to Giacomo Cozzarelli. On the 11th October 1505 the same Ventura di Ser Giuliano Turi de' Pilli, being elected "prefetto della bottega dell' opera," in place of Antonio Federighi, was obliged to keep and maintain, diligent in the office of the Fabric, eight boys, and to teach them his art. They each received one florin, and thus seem to have done some work. Each boy had to be approved by the three "specta-tissimi viri de collegio balie sopra ecclesie cathedralis"—i.e. by the directors or trustees of the building.§

At a later period the foundation of academies, such as that of Lionardo da Vinci, introduced a new element of instruction; and the different fragments of his treatises, for instance that on Cupolas, were most likely not composed only for the instruction of their author, but for the instruction of a class of pupils. At Florence an academy was founded in the year 1563, || and at Lucca schools of Art were founded in 1670 by the painter Pietro Paolini.¶

MS. fragments of Vitruvius, by younger members of the Sangallo family,\*\* and their sketches, made with the object of restoring the figures of the text, show how desirous they were of understanding the rules left by that author. Albertini, a writer of the beginning of the sixteenth century, and somewhat of an architect also, states that he studied Vitruvius and Leon Battista Alberti. Finding also that Guillaume Budé, the learned founder of the College of France, congratulates himself on having had the good fortune of being instructed in Vitruvius by the celebrated engineer Fra Giocondo, from Verona, I felt inclined to ask myself if he did not allude to public lectures or lessons held on Vitruvius, the more especially as two other documents exist which allude to teaching given by Fra Giocondo. About 1507, when writing to the Venetian Senate, he complains that, after having been architect to the city of Paris and of the King of France, and after having been suddenly called by the Pope to Rome for the competition of plans for the new St. Peter's, the Venetian Government had

\* *Annali della fabbrica del Duomo di Milano*, i. p. 202.—H. v. G.

† Op. cit. (vol. i. p. 267 and vol. ii. p. 15) contains some indications as to the instruction of young sculptors (1415).—H. v. G.

‡ G. Milanesi, *Sulla Storia dell' arte Toscana. Scritti varj*, p. 194. Siena, 1873.—H. v. G.

§ "Et teneatur et debeat retinere assidue in dicta opera octo pueros et eos docere de arte sua; qui pueri "habeant a dicta opera florenum unum, pro quolibet et quolibet mense, et approbentur singuli dicti pueri per "dictos tres," &c.—G. Milanesi, *Documenti per la storia dell' arte Senese*, iii. p. 27.—H. v. G.

|| Letter of Vasari to Michelangelo, 17th March 1563, Vasari, vol. iii. pp. 367-375.—H. v. G.

¶ *Guida di Lucca*, di Enrico Ridolfi, 1877, p. 41.—H. v. G.

\*\* At the Uffizi at Florence, at the Corsini Library, and in possession of Signor Ravioli at Rome.—H. v. G.



not yet accepted his offer, made more than a year before, to teach many things which would be useful to the Government, believing that his offers would be agreeable and that pupils were to be given him.\* In a previous letter to the Senate, about 1506, he offered to teach all he knew to three or four, or as many as the Senate would like, who should be assigned to him as of noble minds.†

*Articles of Pupilage.*—The individuality—the personal value—of artists was always held in high consideration in Italy. We find an instance of it in the year 1415, when the directors or trustees of the works of Milan Cathedral said that if Maestro Jacobino was not in that country, he ought to be sought for through the whole world (“nell’ universo mondo”), or in his stead some one else of similar talent, and to be paid any price.‡

On the 21st June 1414 a painter at Siena—Maestro Giovanni di Giacomo—became for two years a pupil of a French goldsmith named Bartolomeo di Piero (de S. Maria de Podio, provincie Franchorum).§ The contract or indenture, written on parchment, preserved in the archives of the duomo at Siena, contains the various conditions for each party, and reveals the respect shown by really good pupils towards a good master, whose duty it was to freely teach his profession and art. The articles bind the master to faithfully demonstrate his industry, to conscientiously instruct the pupil, and to teach him all things concerning his profession, as a true father is accustomed to do for his son, and a perfect master with his pupil; if the master were occupied out of Siena he was to take the pupil with him and not to keep back any professional matters from him, but to treat him in all circumstances as was customary for good fathers with good sons, and a perfect master with his pupils.|| Most likely the position of Raphael at the house of Perugino was much of this kind. The respective situation of master and pupil was no doubt generally settled by a contract drawn up before a notary, which could not be annulled without incurring a considerable fine. This alone can explain the desperate note written by Lionardo da Vinci in 1490 about a pupil named Jacopo, who entered his house at the age of ten—a note enumerating all the mischief done by him and describing his unpleasing character.¶ Chapter 32 of the “Ordinances of the Guild of Sienese “Painters” (1355) forbade any painter to have pupils, or to allow any one else to learn or

\* *Sulla Brentella: relazione inedita di Fra Giocondo, con prefazione del Prof. Luigi Bailo*, p. 22. Per Nozze Revedin di Gropello Tarino. Treviso, 1882.—H. v. G.

† Letter of Fra Giocondo at the Archivio di Stato, Venice.—H. v. G.

‡ *Annali della fabbrica del Duomo di Milano*, ii. 15.—H. v. G.

§ G. Milanese, *Documenti per la storia dell’ arte Senese*, “Jacobus teneatur, et debeat per totum tempus pre-dictum eidem magistro Bartolomeo in arte et ministerio antedicto bene et diligenter servire, et eundem magistrum Bartolomeum prosequi, et eundem vereri et honorare, tamquam faciunt et facere consueverunt veri boni discipuli erga bonum magistrum, gratis et sine aliquo salario, et suis dicti Jacobi propriis sumptibus et expensis. . . .

“ . . . Magister Bartolomeus teneatur et debeat per totum dictum tempus erga dictum Jacobum, personam libere exhibere erga dictum ministerium, et artem suam, et industriam fideliter demonstrare, et ipsum Jacobum fideliter erudire, et eundem docere in cunctis ad dictum ministerium et artem exigentiis, tamquam facit et facere consuevit verus pater erga filium, et perfectus magister erga discipulos suos.”—H. v. G.

|| *Ibid.* ii. pp. 65–67. And in the case of non-fulfilment “sub pena, et ad penam centum florenorum auri: quam penam,” &c.—H. v. G.

¶ E. Müntz, *Revue des deux Mondes*, 1st January 1891, p. 136. Also Dr. J. P. Richter, *The Literary Works of Lionardo da Vinci*, Article: Pupils.—H. v. G.

exercise art in his studio, unless he had sworn to the prescriptions of the guild.\* In 1361, by chapter 52 of the Ordinances of the Guild, a master was forbidden to admit a workman or pupil into his shop unless he had satisfied his last master; and chapter 93 forbade any goldsmith to be a fellow or mate (*compagno*) or to open a shop without a license from the Guild of Goldsmiths.† Domenico di Niccolo, master of intaglio and tarsia, writes a petition, dated 13th May 1421, to the Government of Siena, stating that several honourable citizens had told him that he would do well for his honour and the advantage of the city to have with him some pupils who would learn his art. He adds that it would be "singularissima gratia" for him to teach others and let them participate in the grace God had granted him; but being poor, and each pupil requiring a cost of about thirty to forty florins a year, he asks if the Government would grant him for the purpose "una poca di provisione," i.e. some salary for that purpose. Two hundred lire free from tax were granted for keeping continually two or three young men "ad adiscendum dictam artem, procut offert."‡

Giovannantonio Sodoma also undertakes, 11th January 1517, to teach Art (*l'arte*) for six years to Matteo di Giuliano di Lorenzo di Balduccio. During four years Matteo had to pay to his master Sodoma twenty ducats (*ducati di Carlini*) each year, at the feast of the Holy Virgin in August, and during the two other years at the convenience and will of Sodoma, who was obliged to give to Matteo his expenses (food and shoes) and to clothe him in a fitting manner.§ In 1521 Ventura di Ser Giuliano di Tura Pilli, in a petition to the Government of Siena, writes that he lost his youth, and spent almost all his life, in search of antique forms and ornaments, of which he collected such a great number in that city that it might be said that the Antique had been found again there through his exertions. Thus he neglected laying by money for his old age, and therefore asked for a pension.|| And in 1506, at Lucca, in the cathedral, we see a statue, the first work of Vincenzo Civitali,¶ offered by him as a present to the Government in order to obtain a subsidy or aid to enable him to make further studies.

#### BRAMANTE'S LITERARY WORKS.

Of the literary works of Bramante, unfortunately, there is not very much to say. His treatise on the Proportions of Man is lost; that on the Proportions of the Horse, after having belonged to Raphael, Polidoro, and Gaudenzio Ferrari, came into the hands of Luca Cangiasso, and since then has been heard of no more.\*\* But, according to Gian Francesco Doni, in his *Libreria Seconda*, published in 1551 at Venice,

\* G. Milanesi, *Storia dell' arte Senese*, i. p. 13, . . . "che tengha alchuno gignore (*sic*) overo discepolo . . ."—H. v. G.

† G. Milanesi, *Storia dell' arte Senese*, i. p. 11; see also E. Müntz, in his *Histoire de l'Art pendant la Renaissance*, ii. p. 191, and in his *Raphael, sa Vie et ses Œuvres*, 2nd edit., pp. 19–20 and 39–40.—H. v. G.

‡ G. Milanesi, *Storia dell' arte Senese*, ii. p. 103.—H. v. G.

§ G. Milanesi, *Storia dell' arte Toscana: Scritti Varj*, p. 194. Siena, 1873.—H. v. G.

|| Son of Masseo di Bartolomeo, *Guida di Lucca*, 1877, p. 126.—H. v. G.

¶ G. Milanesi, *Storia dell' arte Senese*, iii. p. 75.—H. v. G.

\*\* According to Lomazzo; see *Trattato della Pittura*, lib. iv. p. 320.—H. v. G.



Bramante wrote five books on Civil and Military Architecture, though no one else appears to have seen them, and subsequent writers do not place much faith in the information given by Doni. Seeing, however, what Bramante was, and considering how many of far less genius than he tried to write, at that time, on architecture, I firmly believe that Bramante also must have done so. I was therefore not astonished to find, a few years ago, among the MSS. of Vitruvius which formerly belonged to Bramante's dear friend and pupil Raphael, some sheets of paper containing a fragment of a treatise on the proportions of the antique temples, accompanied by diagrams, written and drawn in an old trembling hand, identical with that on some of Bramante's studies for St. Peter's, and consequently I believe myself to have been in the presence of the fragment of a treatise by Bramante. I have also had the good fortune to recognise, in an album\* preserved at the Soane Museum, a series of sketches [figs. 43, 55] for Intarsia, which, though without text, may be considered as a sort of treatise, if only from a certain order in the examples given; and I believe Bramante to have been the author of it. Moreover, in the course of the present year, I hope to add to his works a far more important fragment, containing no letterpress, it is true, but numerous studies of plans for palaces and churches, according to a systematic method, and destined, no doubt, for a treatise. I have also given a reproduction of what I believe to be Bramante's handwriting [see next page] in order to call attention to its style, and in the hope that it may lead to the discovery of other fragments. It is the only fragment at present known which can be attributed to him and likely to be in his handwriting; and it may be interesting to explain how I discovered it.

The Royal Library at Munich contains the celebrated manuscript translation of Vitruvius which was made for Raphael by M. Fabio Calvo. When I saw it for a second time, in October 1886, I recognised it as being entirely in the handwriting of the famous architect Antonio da Sangallo the younger, who was one of Bramante's pupils, and who, at a later period, was one of the assistant-architects under Raphael at St. Peter's and at the Villa Madama. Connected with that manuscript is a second, also relating to Vitruvius, and for the greater part in the handwriting of Antonio da Sangallo. Then follows the well known original letter of Raphael to Leo X., on the protection of the antique monuments, also in the handwriting of Antonio da Sangallo.

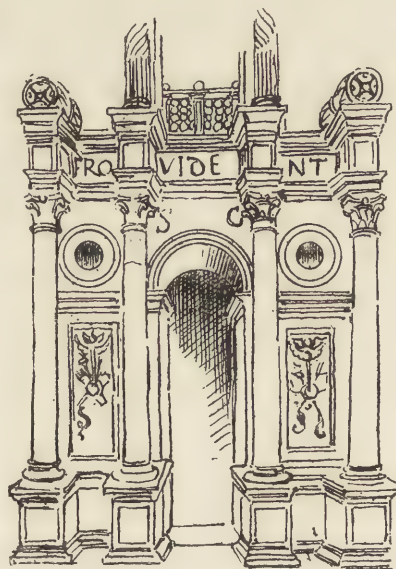


FIG. 55.—PART OF ONE OF THE SKETCHES FOR INTARSIA, AT THE SOANE MUSEUM.

(From a sketch by the author.)

\* See a letter on "Bramante's Drawings at the Soane Museum," in *The R.I.B.A. Journal*, Vol. VII. N.S., pp. 190-191, from the author of this Paper, addressed to the President.

Now the second of these manuscripts (cod. Ital. 37 a) contains, from pages 63 to 69, a fragment connected with Vitruvius, on quite different paper and in different

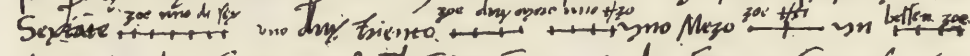
Se adunque la natura da eme due le prime due ascende a phisici a pfectione<sup>65</sup>  
 Ancora phisici a phisica questo esse el numero pfecto qual se pfecta da  
 cose singulare che da greci sono dicti monades: da latini numeri pfecti  
 simplici & anelli no sono pfecti fin che no se giugne la decena et quando  
 sop avanzano e fanno xi no se chiamano pfecti fin altre decena. A donde  
 tutte le cose singulare o xxi simplici sono parate de questo numero de x.  
 Li matematici disputando per questo dicono che el numero pfecto sia el  
 sei po che i lue molte ptezione quierente sia ora: che sono queste xvi  
 Septate  uno duo tre quattro cinque sei sette otto nove dieci undici dodici tredecim quattordici quindici sedici  
 duo tri: et dimero xvi quare El primiero xvi . 5 . lo pfecto xvi intero sia . 6 .  
 Crescendo sopra ala duplicazione xvi azogendo . 1 . a . 6 . fa . 7 . se li azogi el  
 terzo xvi . 2 . fa . 8 . 4 . moltiplicandolo xvi azogendoli 3 . al sestante fa . 9 .  
 qual innameto da 8 e dicto octavo et epimeros et sagittatus: / Se li azogi  
 li duo tri xvi . 4 . fa . 10 . lo annulo . che e deve . Se gli azogi al . 5 . el finz  
 fa . 11 . el Bes che da 8 e dicto epimeros xvi . 11 . et p qz gli sono azogi cinque  
 e dicto quinario che da greci epimeros e chiamato . Diplasione chiamato  
 el dodici p che e composto da duo simplici numeri de cio de duo sex  
 Non molto anchora prispeto che trovano<sup>in anulo</sup> che pe essere laseza parte  
 de lomo pbravano ancora et terminano el sex esse numero pfecto  
 Considerano ancora el cubito gstrae da palmi . 6 . che danno digitos  
 Cossi como il cubito e palmi . 6 . cossi ancora ne la cita de greci si vza  
 nela diagona li anoi xvi monete dizanne somati como li anoi del qual se  
 che sono pelati oboli . li gstrae deli oboli che da alcuni son chiamati . 1 . diobolus  
 da altri trialechi: p li digitos<sup>et</sup> sono ne la diagona gstrati  
 Li nostri pma fecero lo antico numero: et nel decenario deve anoi gstrati  
 e questa ppozio de cose fina al di pms restiene el nono denario. Ancor  
 la parte quarta la quale se facera de duo assis e mezzo glio chiamorono  
 Pyroreio Poy che debbo cognosmo el sex et deve essere numeri pfecti li  
 gtrati insieme et fecero uno numero pfectissimo che e sedici  
 Li anoi di queste cose trovano el pede che e digitos . 16 . e tanti assis ha  
 lo denario uno fexo se lie cosa quierente che il numero sia trovata da li  
 anoi de lo homo: et de li separati membri ala minorza specie del corpo  
 che una parte esse face el resto de le misure . Ne resta che ad to li  
 dobbiamo da quelli che costruiscono uno li edificij de li dei immortali:

FIG. 56.—REPRODUCTION (SLIGHTLY REDUCED) OF PART OF A TREATISE THOUGHT BY BARON H. VON GEYMÜLLER TO BE IN THE HANDWRITING OF BRAMANTE (CONTINUED ON THE NEXT PAGE).



La scala figura li edificij suoi e diuina. Proptilos & per  
ogni forma con quello che dico i ante. fatto e lo ha in li  
angoli o per corno colonne. e conde dominare angolar  
effere poſſe in li angoli: eſſimo poſſe per de ante per colonne quado  
amante no la puer. & di ſop. de collocare li epistily o per  
e da la detta de la finſta i cingura puer como in iſteſo.  
nella prima figura detta i ante

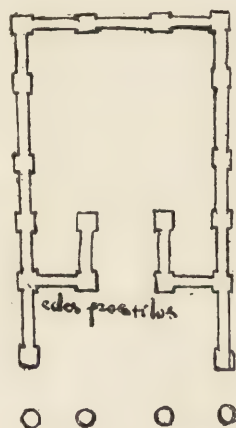


FIG. 56 (continued).

writing, illustrated by sketches evidently by the same hand. The caps of the columns are identical in touch with those in the facsimile\* of Bramante's study for St. Peter's; the dialect is partly that of Northern and of Eastern Italy, where Bramante was born, and where he found a second home; and further, this handwriting rather resembles that of a fragment, of which we only possess an old facsimile, known to have been written by Bramante's own hand. Finally, Raphael was his friend, successor, the obvious inheritor of many of Bramante's papers; and the MS. reproduced in fig. 56 is known to have come from Raphael's house. All the circumstances united make it almost certain, in my judgment, that those few pages of manuscript which I have described are in Bramante's handwriting, and probably part of a treatise he composed.

Perfection was the aim of Bramante's life and art. By his education, as well as by his studies, Bramante, the pupil of the four greatest men in Architecture, Painting, and Perspective, not satisfied with that which could be taught by man, became the disciple of Divine Nature, discovering (as writes Lomazzo in two special treatises) the proportions of the horse as well as those of man. He was the most learned man of his time in the science of building and in the harmony of proportions, as well as of

\* *Les Projets primitifs*, p. 202, text.—H. v. G.

drawing and of "looking at a monument." Bramante knew the scientific, geometric, or æsthetic reason of everything he did, the exact value in the domain of beauty of every form he used, and the order and proportion in which each element should be combined with the other.

In my judgment Bramante was not only the greatest scientific man in the arts, and in what can be taught and learnt; he was also, I think, the most naturally gifted architect that ever lived. Neither Phidias, nor the architect of the Erechtheum, nor any architect since Bramante, has received a greater power of creating that sort of beauty which I should like to call essentially "beauty by the grace of God," and which according to the moment we call Athenian, Raphaelesque, and in music Mozartesque. But this is not all. Bramante had received that grace in an equal degree in the domain of the infinitely grand, powerful, and harmonious conception of the whole, as well as in the domain of infinitesimal delicacy of detail; and thus he stands higher than any master I know. Bramante's very name is the image of his inward nature: in Italian it means "always longing." His nature made him the representative of modern architecture, which since the fall of the Roman Empire has consisted of combinations, in different proportions, of antique elements and of elements expressing the tastes and feelings of the Northern nations. In Bramante, after more than a thousand years of effort, a perfect harmony was obtained between the Southern and Northern elements, expressing laws of universal truth and the legitimate freedom of personal individuality. Bramante's St. Peter's—I do not mean the actual one—combined all that in Antique and Mediæval art was most powerful, most beautiful, and most charming. It would have been not only an architectural symbol of the Christian unity of faith, but the grandest, most majestic, and most beautiful temple ever erected.

HEINRICH VON GEYMÜLLER.

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\* \* \* The Discussion [see verbatim report in *The R.I.B.A. Journal*, Vol. VII., pp. 155-158] of Baron von Geymüller's Paper was opened by Professor Kerr, a brief abstract of whose remarks and of those of the subsequent speakers is here appended:—

PROFESSOR KERR, *Fellow*, thought England was drifting towards—as a conclusion, as an end—that state of things which the Italian architects had for their beginning, namely, the unity of art. The idea that all art was one art, and all equally dignified, equally good, and equally useful to the human race, was acquiring great force. It was remarkable that, at the period called the Revival of the Arts and Letters in Italy, almost all the architects were either painters or sculptors or artistic designers of some other than architectural work; and he considered Bramante might be taken as a leader of the great movement which had been constituted by the revival of Roman architecture. Teutonic architecture had never taken a hold on Italian ground to any extent, and when the mediæval Christian system of politics came to an end, it was necessary that a new architecture should arise. He considered Bramante did what was right in going to Rome and studying and sketching the old Roman remains,



and, by so doing, beginning where his predecessors on Italian ground had left that style of building-design which had belonged to Italian ground. Thus it was that a modern European style arose into existence through the careful manipulation of such men as Bramante. A lesson was to be learnt in England from the attitude and position of Bramante. The "Queen Anne" style he considered only to be a stepping-stone from the very remarkable revival of Gothic to a new revival of modern Classic which was coming; and he advised students to do as Bramante did—to study the old work, and, above all things, to study its mouldings.

COLONEL PRENDERGAST, *Hon. Associate*, thought the present the time to revert to the period described by the Baron, as there was a positive thirst in England for adequate scientific architectural expression; and that nothing could be obtained more suitable to the requirements of the age, or of a more refined character, than might be derived from the works of Bramante. For example, a work of such simplicity and beauty as the quadrangle of Santa Maria della Pace [fig. 36] was full of instruction. The smaller and less-known rooms in the Cancelleria Palace contained the very thing wanted in England.

PROFESSOR G. BALDWIN BROWN, M.A., *Hon. Associate*, thought the most important work of Bramante was the design for St. Peter's, Rome; and it was not uninteresting to find that the Greek cross on the great central dome was also before the mind of Wren when he set about designing St. Paul's, although in neither case carried out. He hoped some of the present generation of architects would work out that scheme with the materials left by Bramante. The subject of the system of proportions which had been adopted by Bramante was one of the deepest interest.

MR. H. H. STATHAM, *Fellow*, referred to a very remarkable engraving after Bramante in the British Museum, which had been mentioned by Baron von Geymüller, and which seemed to sum up the spirit and peculiarity of Bramante's architecture, and of the architectural feeling of the Renaissance; and then mentioned three other small engravings there, which were marked and catalogued as Bramante's, and which he hoped were genuine. They represented an architectural composition consisting of two parallelograms placed parallel, and in the middle a triumphal arch connecting them, and were designed so that the mass of the two sides should be the same, while they were treated absolutely diversely in every detail. They were, he considered, remarkable instances of an attempt to treat two blocks of building symmetrically in general mass, but diversely in detail; and he hoped that the Baron would not tell them that those drawings were not Bramante's. It had been often said that architects of that period were first painters or sculptors, one effect of which was that they were rather afraid of what they had to do architecturally, as was shown in the Baron's book on St. Peter's; and he thought students of architectural history should look at that book to see the way in which a building like St. Peter's was carried out in those days, for it gave a new insight as to the tentative way in which its architects set to work.

MR. ARTHUR CATES, *Vice-President*, said the account of the assiduous manner in which Bramante studied the ancient monuments of Rome was most interesting; a like careful study of detail had been too much neglected by English students. In Milan existed a remarkable church—that of San Lorenzo—the plan of which was based probably on that of the foundation of the central hall of the great Baths of Maximianus Herculus, which occupied its site; and there was in some respects a remarkable similarity between Bramante's first sketch-plan for St. Peter's, with the Greek cross, and the plan of San Lorenzo as Bramante must have known it, for then probably a good deal of the original Roman work remained. Certain peculiarities in that plan induced the speaker to believe that Bramante's careful study of it had led to his happiest inspiration, and that he had attempted to realise in his first sketches for St. Peter's the plan of the Church of San Lorenzo as he had seen and studied it—before one of its vaulted ceilings fell, early in the sixteenth century, and its subsequent restoration.

THE PRESIDENT remarked that in the Baron's description of Bramante's wonderful qualities little had been said of his extraordinary readiness—he appeared to be always ready, when opportunity presented itself, to prepare a design on the spot, and to the astonishment of his employers; and the speaker thought that quality was brought about in great measure by the manner in which Bramante improved his opportunities of studying the works of the ancients.

BARON H. VON GEYMÜLLER, *Hon. Corr. Member*, said he had not seen the three engravings alluded to, but supposed they were the same as existed in Paris. All he thought could be said of them was, or rather of the one described by Mr. Statham, that it might have come from some drawing

made by Bramante, but it was not perfect enough to have been etched by him. As to the Church of San Lorenzo, on one of the studies of Bramante for St. Peter's there was a plan which appeared to be a fragment of the plan of San Lorenzo.\*

\* In the present state of our knowledge of architectural history, it cannot be too often repeated that the study and analysis of the original drawings of the Italian Renaissance are of the utmost importance for a



FIG. 57.—COPY OF A DRAWING BY BRAMANTE.  
(Reduced from a photograph of the original.)

asking for information as to any MSS. or drawings in their possession likely to be the work of Bramante or his pupils; or connected in any way with them.

future and more exact record of that great period of art. The number of facts thus obtained shows that prevalent ideas concerning styles arrived at by an examination of the executed works only—with the help of written information—are frequently far from being a faithful reflection of the true course of development and progress in architecture. In order to illustrate my meaning, perhaps I may be permitted to give, for the information of English readers, some particulars—referred to in my book on *Raffaello studiato come Architetto*—of a drawing by Bramante [fig. 57] which I found at the Uffizi, in Florence, under circumstances so exceptionally strange and lucky that they may never recur. This drawing was formerly cut in two: the lower half having been attributed to Scamozzi, the upper to Peruzzi. The two halves were preserved in different portfolios; and each time I happened to fall in with them at the Uffizi Gallery I felt that they must be by the author of the study for San Pietro in Montorio, which I published in the last plate of my book on St. Peter's. One day, having placed them together, I found that they were two halves of a single drawing, and by the same hand, which was neither Peruzzi's nor Scamozzi's, but that of Bramante. The drawing shows (1) that the sort of window with its entablature continued along the face of the wall, above the panel—reproduced, it was thought, for the first time at the Pandolfini Palace in Florence, and consequently the invention of Raphael—belongs in reality to his master, Bramante; (2) that it must have been drawn some twenty years earlier than the designs for the Pandolfini Palace, as there are no signs in it of that trembling connected with Bramante's well-known *bodagra* of the hands; and (3) that at the moment when his designs for the Cancelleria were in course of execution, Bramante was less tame and gave more projection to his mouldings, when he chose, than in those two palaces of his design then actually standing in Rome.—H. v. G.

\*\* A communication has been addressed, by authority of the Council, to the curators of the principal European Libraries,



LXXX.

WROUGHT-IRONWORK: MÆDIEVAL PERIOD.

By MR. J. STARKIE GARDNER.

Mr. Alfred Waterhouse, R.A., *President*, in the Chair.

MR. PRESIDENT AND GENTLEMEN,—

IRON was used by the ancients to a limited extent in their architecture, and might have played an important part in it, had the Roman Empire survived. But with its collapse vast schemes of architectural enterprise ended, and there is little trace of its use in buildings on the Continent until long after the days of Charlemagne. Its use seems to have been resuscitated in England, perhaps from the blending of Danes with Celt and Saxon, on a soil still enriched with the remains of Roman civilisation. If we may place reliance on illustrations to Anglo-Saxon manuscripts, English ironworking was as well developed in the tenth century as at any period down to the thirteenth. In these illustrations the artists may have given to the hinges more refined and fanciful forms than perhaps existed in the uncouth originals, but they show that doors were already covered with elaborate work, which was placed there perhaps as much for defence as for ornament. Here [fig. 58] is the door in a representation of Noah's Ark in the Claudian MS., B. IV., at the British Museum, a manuscript of the tenth century; and the original illustration shows that the habit of placing a scarlet lining between the wood and the ironwork already existed. Figs. 59, 60, and 61 show weather-vanes and finials, and the latter on the gable-ends seem, from their slender, scrolly outlines, to have been iron; their presence is universal, even the representation of Westminster Abbey in the Bayeux Tapestry having a clumsy representation of the typical form. Many representations of iron hinges will also be found in the Claudian MS., above mentioned, and the Cædmon MS. at the Bodleian contains others. The diagrams seem to show that the use of ironwork



FIG. 58.  
DOOR, TENTH  
CENTURY.  
From the Claudian MS.

in English buildings had already taken deep root before the Conquest. As far as I am aware, illustrations of ironwork in contemporary Continental manuscripts are rare, and show work of only the plainest character,

It is unlikely that any existing hinges belong to so remote a period, though the habit of transferring some ironwork from older doors to new must make us cautious in assigning dates. There are a few, however, whose design can only be reconciled with



FIG. 59.  
FROM AN ENGLISH  
MS. PRESERVED  
AT ROUEN.



FIG. 60.  
FROM THE CLAUDIAN  
MS. IN THE BRITISH  
MUSEUM.



FIG. 61.—FROM THE CLAUDIAN MS. IN THE  
BRITISH MUSEUM.

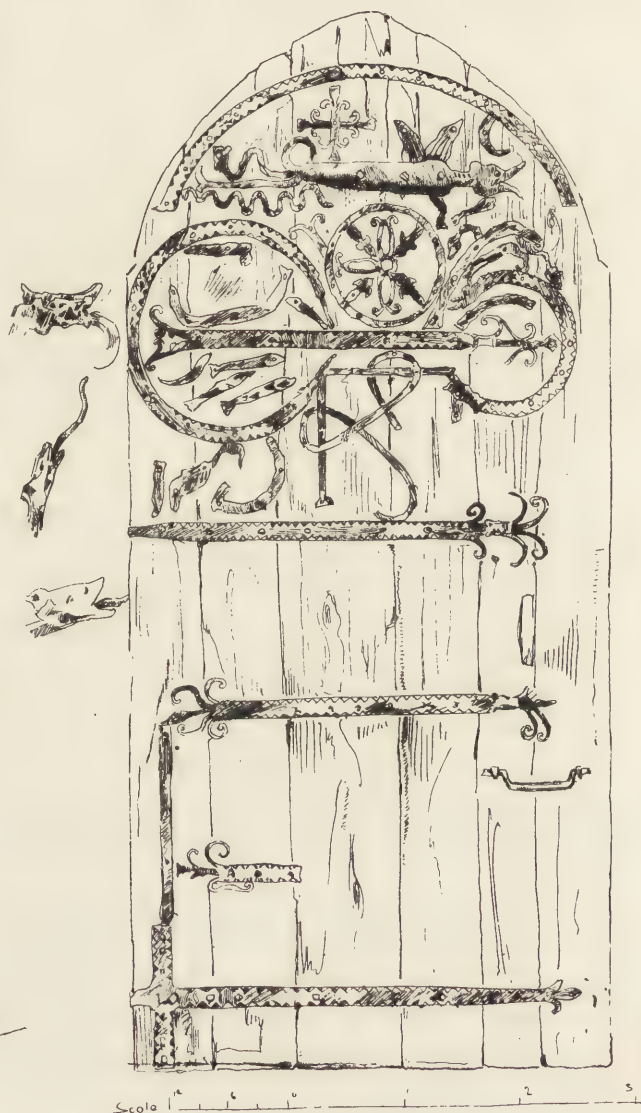


FIG. 62.—DOOR AT STAPLEHURST CHURCH, KENT.  
(From a drawing by Mr. O. Albrow in the South  
Kensington Museum.)

very early times; in these the smith appears to have had complete liberty. A very careful drawing made last year represents the Staplehurst example [fig. 62], and there is another of the same character at Stillingfleet in Yorkshire. The latter has bands like knotted rope, a boat with rudder, and some men. They are both mere wrecks of



what they once were, and have decayed considerably even since illustrations of them were first published, some thirty years ago. Any one conversant with Danish archæology may possibly recognise in the dragons, boats, serpents, fylfots, and the plaited ropes, a Danish inspiration. The hinges themselves, you will notice, are of crescentic form,—a form that does not occur in any Norse hinge I have seen, and which I regard, for the present, as essentially English. The oldest representation of a crescent hinge is on the well-known Selsey bas-relief at Chichester. This crescent form, when of stout material and welded close on to the base of a strong central strap, is very difficult to forge, but is the strongest form of hinge that can be devised, for the springing of all three straps is well under the door-jamb, and so covered that it is impossible to wrench them away. The form [fig. 63], dictated by stern necessity, prevailed almost to the exclusion of all others, until long after necessity for defence had passed away, and Pointed architecture had set in. Another design, in which the Danish spirit is less apparent, is the door at Skipwith, covered with large interlacing circles, with fylfots, Greek crosses, and other emblems in the intersections. It has been restored, and its interest thereby lessened, but not so much as in a case at Copford, where the old iron itself is preserved, but worked up into an entirely new design. I trust I may be permitted to express the earnest hope that the few specimens of ancient ironwork remaining to us may be preserved without restoration, and that, when no longer serviceable, they may be placed in museums.

The Danish influence, denoted by the use of emblems, designed, it would appear, to propitiate the Evil no less than the Good Spirit, appears on the wane in the



FIG. 63.—DOOR TO ST. MARGARET'S CHURCH, LEICESTER.  
(From a photograph. The pointed strap at the top is a fourteenth-century addition.)

ornament which covers the door at Little Hornead; this ornament is based on the intersection of large circles, in the interstices of which were some animals, like ravens and sea-dragons. An identical design, formed of the intersecting circles on a smaller scale, was used in vertical

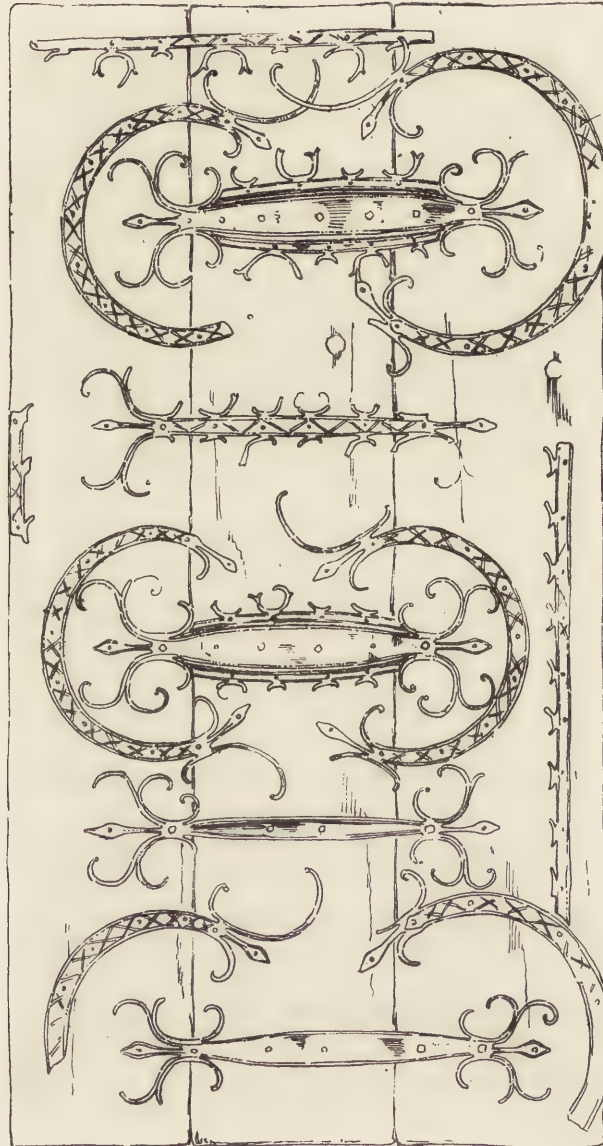


FIG. 64.—DOOR AT EASTWOOD CHURCH, ESSEX.  
(From a drawing by Mr. O. Albrow in the South Kensington Museum.)

bands to cover the north door of Durham Cathedral, and is still traceable on the woodwork. The border or binding to the door recalls the shape of some scrolls under which human skin with fair hair was found at Hadstock Church; it also links the Hornead door with the fine example at Willingale Spain, in Essex. The latter is closely allied to the one [fig. 63] at St. Margaret's, Leicester, both having the crescentic hinge, the cross and the diagonal straps, richly fringed; and representing, it would appear, in some sort, javelins and arrows. The horns of the crescents end in serpents' heads, and the presence of these in some form or other, in all the rich specimens of hinge-work down to the fourteenth century, shows how tenaciously the blacksmith held to the Danish tradition. There are also fine specimens at Eastwood, Essex, with the common fish-shaped reinforcing pieces [fig. 64], and many others, which, rich or plain, appear to belong to the same period.

Scarcely less ancient perhaps is the Haddiscoe type, in which we have the scrolled



pletely destroyed by restoration, was of the same type, but later; and I believe yet others exist. Of a ruder and more ordinary type is the specimen from Hartley Church, Kent [fig. 65]. It is difficult to say what the original design may have been, but the broad crescent straps terminating in small serpents' heads, and the straps ending in rather delicate scrolls, are of early work; while those ending in a clumsy fleur-de-lis are probably late fourteenth-century repairs. Many other interesting types are at Edstaston (Salop), Woking, Sparsholt, &c.; and nearly all the forty examples of crescent hinges, of which I possess drawings, present peculiarities worth notice. Their salient features are strength, independence of architectural style, and an ornamentation derived almost exclusively from the animal world and from symbolism. That the style was not introduced by the Norman-French seems clear from the fact, that while the English names for mason, sculptor, plasterer, painter, joiner, carpenter, plumber, tailor, were lost, the Anglo-Saxon "smith"



FIG. 65.—DOOR IN HARTLEY CHURCH, KENT.  
(From a photograph.)

held his own, and the Norman "farrier" sank into the subordinate rôle. Apart from this, however, no one who has studied the hinge-work of the two countries could suppose that our early ironwork was derived from France. The crescent form is found in Normandy, but it is seldom in the original form, being either stalked, so that the strength is lost, or the centre strap is severed and made a separate piece, or omitted



altogether. It was maintained, however, as long as Romanesque architecture existed, and, in passing down to the South of France, developed into a very peculiar style

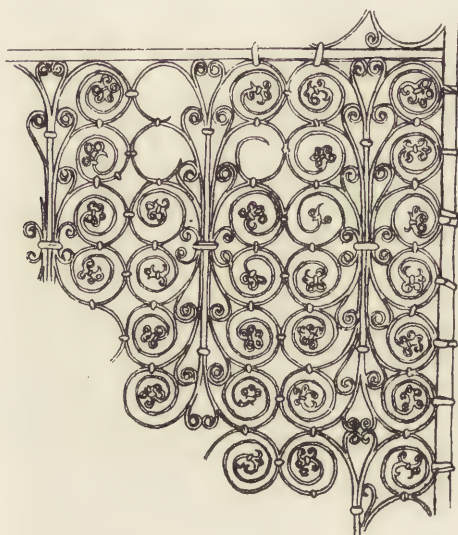


FIG. 66.—PORTION OF THE WINCHESTER GRILLE.

of open work and perforated hinge. Specimens have been figured by Didron, Corblet, Raymond Bordeaux, &c., from the Berri, Auvergne, and Languedoc following south; and following west from Champagne, Lorraine, and Alsace. Their peculiarities increase with their remoteness from the centre of inspiration, which I believe to have been at that time England.

The later Norman period saw the introduction of iron grilles and screens in cathedrals and abbeys. At first precisely the same design seems to have been in use from England to Spain, though not in Germany or Italy. The oldest specimen in England is at Winchester, now a mere patchwork against the disused north door of the nave, but



FIG. 67.—PORTION OF THE OURSCAMP GRILLE.

The upper scrolls and the base are modern additions.

originally protecting the shrine of St. Swithin. It dates back, in all probability, to about 1093. It consists of a series of scrolls, one within the other, welded together within a framework of massive vertical bars [fig. 66]. A rich grille of the same type existed at the Abbey of Ourscamp, now almost wholly destroyed; a fragment of it [fig. 67] was converted into a fireguard, and other fragments are at the Cluny Museum, and in private collections. The only grille of this type *in situ* in France is at the



Puy-en-Velay. Spanish examples, no doubt posterior to ours, are at Avila, Pamplona, Palencia, and Leon. A grille at the Abbey of Conques is valuable as connecting this somewhat heavy style with the lighter one which succeeded it. Of this latter we have, protecting the choir in Lincoln Cathedral, the most perfect example extant, and only lacking the original cresting. The design throughout consists entirely of small scrolls in a massive framing with heavy cornice, and a sheet-iron binding at the base pierced with quatrefoils. This sheet-iron binding with the quatrefoils is also used

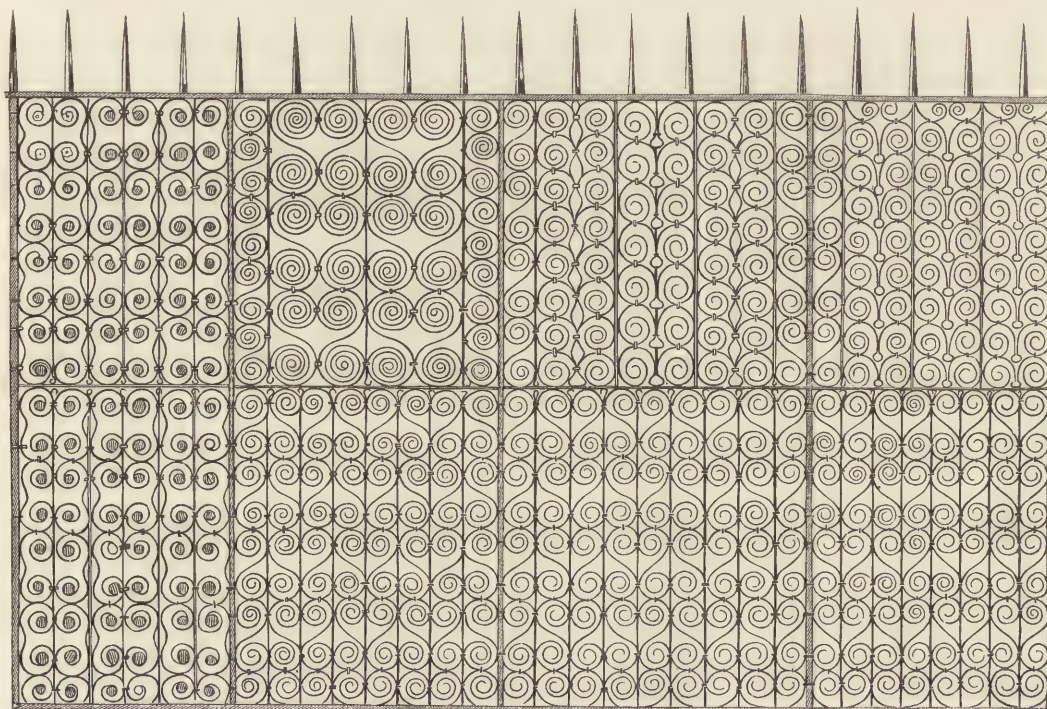


FIG. 68.—PART OF A GRILLE, FORMERLY IN CHICHESTER CATHEDRAL.

(From a sketch by C. R. Baker King, *Associate.*)

for the base of the grille at St. Albans, the only lattice grille we possess in England. The Lincoln grille must be of the twelfth century, and the type was very popular, as there is a picture in the Louvre showing that all the chapels in the Apse of Notre-Dame, Paris, were closed with it. The choir of Arras was also closed with it; that of Saint-Germer still possesses its grille of this type; and existing fragments show the former presence of others at Cluny and St. Albans, while the Crusaders used the same design for their choir-grille in the Dome of the Rock. The cresting was in all cases a simple arrangement of spikes for defence. The grille to Anselm's Chapel in Canterbury Cathedral is a late survival of this type. We have, unfortunately, lost the far more interesting grille which existed at Chichester. Part of it [fig. 68] was, however, sketched as it stood in a local smithy, after its removal, and some other parts have been published in America, whither I conclude it has found its way. It was a perfect storehouse



of design, and its destruction an inexcusable act of vandalism. It resembled somewhat, except in its cresting, the grille from Saint-Aventin, figured by Didron, in which the panels are also varied. It was doubtless a thirteenth-century grille, and is especially interesting as affording an example of the introduction of stamped leaves at the ends

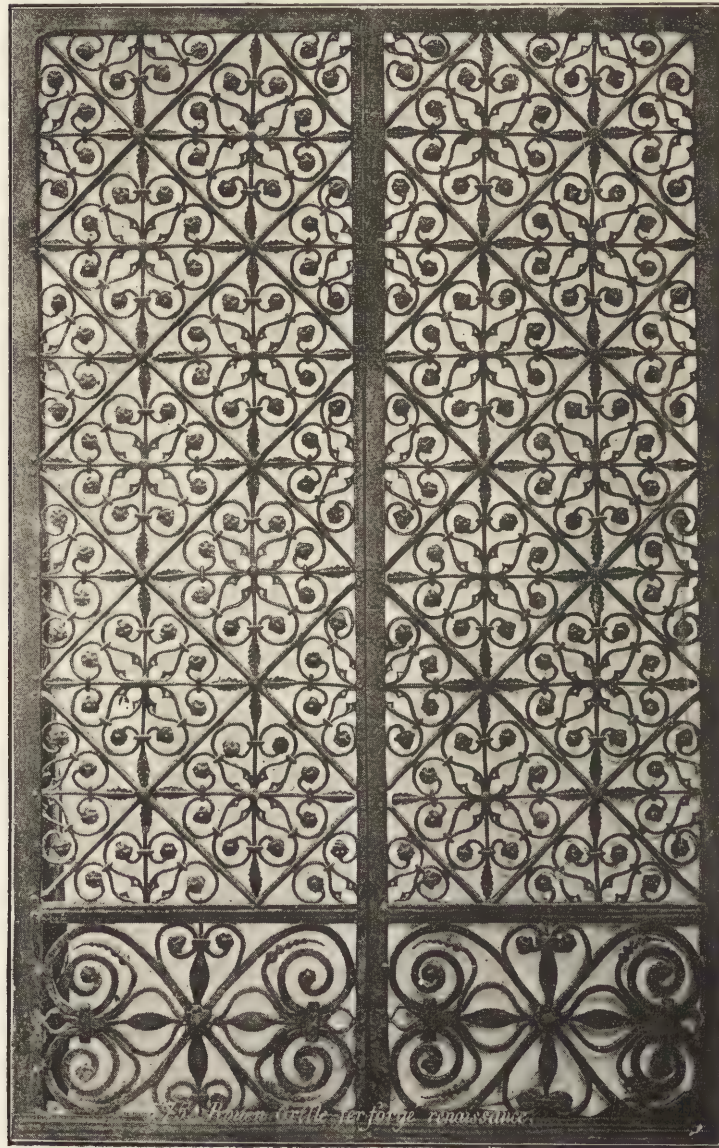


FIG. 69.—A PAIR OF THIRTEENTH-CENTURY DOORS IN THE ROUEN MUSEUM.  
(From a photograph.) The lower panels are of later work.

of scrolls in English grille-work. I am glad to have been instrumental in securing two of these for the South Kensington Museum, the only specimens of old English ironwork they possess. The doors at Sempringham have binding, hinges, and

of scrolls in English grille-work. I will conclude this series of grilles with an example [fig. 69] from the Museum at Rouen, in which not only stamped heads and leaves are introduced, but a diapered construction of the ornament,—which we shall presently see reappear on the door leading from the cathedral to the cloisters at Durham [fig. 70].

The hinge-work of the later Norman period gradually loses its savage aspect, and the crescent-ends, instead of simulating serpents' heads, become leafy flowers and scrolls. There are good examples at Erith, Kilpeck (Hereford), and Ged-dington. At Chichester and Peterborough one or two slightly modelled leaves occur in the design. At St. Albans there were some very rare examples of a departure from the cres-



numerous crosses fringed with rude thirteenth-century-looking leaves. Those at Southwell Minster are a departure in favour of plain and not inelegant scrolls. It is evident that design in hinge-work was still a matter of caprice and in untutored hands, though some, like those in the north aisle of the choir at Canterbury, which nearly resemble hinges at Saint-André, Chartres, show architectural influence.

The birth of Gothic architecture in France put an end to barbaric hinge-work, since it necessitated a much more definite and refined treatment. The beautiful diapered work at Durham, and the exquisite fleur-de-lis and scroll-work at Worksop, a cast of which is in the Architectural Museum, are the first instances of design of a high order introduced into ironwork in this country. They are both in late Norman doorways, and belong probably to the close of the twelfth century; the former is the first to show a modelled, in place of merely an incised, surface-decoration of the iron. The Durham hinge [fig. 70], in its treatment and detail, is very like the French work figured by Viollet-Le-Duc and others from Neuvy-Saint-Sépulcre, Levroux, the Puy-en-Velay, and Orcival. All have the same tongue between two unequal scrolls, and hollowed stems with raised edges. These two hinges stand so completely apart from the development of hinge-work in England, that I can only regard them as of foreign inspiration, and the Durham one of foreign handicraft. There is a consensus of opinion in France that the French

were capable of producing this modelled work from quite early in the twelfth century. The French MS. Nero, c. IV., in the British Museum, which is believed by Mr. Parker of Oxford to date from about 1125, shows hinges of the French type—*i.e.* a bundle of stems with modelled surface tied together by bands, and springing into a tuft of flowers and leaves at the end. This was accompanied, or followed, by the free treatment of the leaves, which were no longer confined to a terminal, but grew from all points and covered

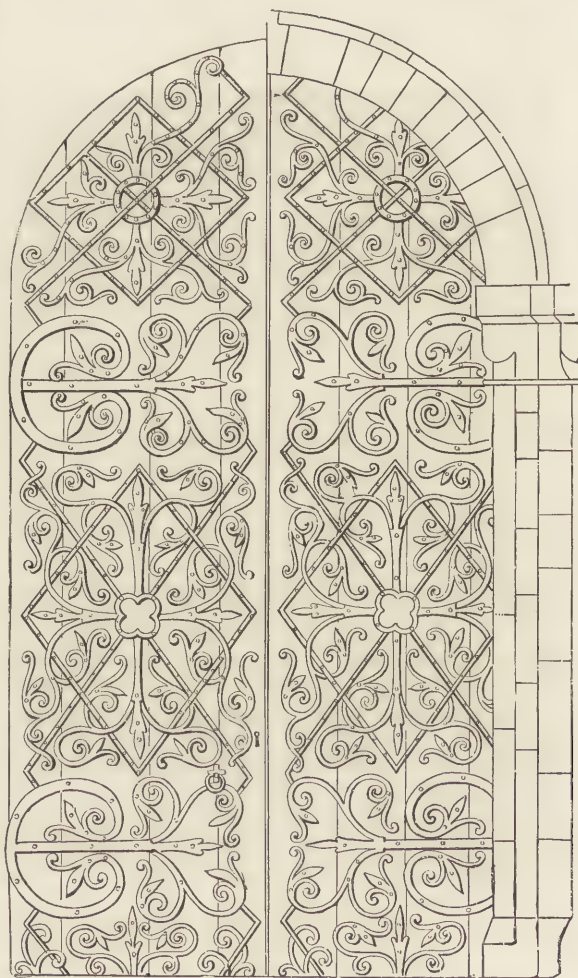


FIG. 70.—HINGE-WORK AT DURHAM CATHEDRAL.

(From a drawing by Mr. O. Albrow in the South Kensington Museum.)



large parts of the door. The work culminated in the magnificently rich hinge-work on two of the west doors of Notre-Dame, which we need not stay to describe. Nothing is really known as to where or when they were made, but several French writers ascribe them to the latter part of the twelfth century.

There is nothing certain as to dates of ironwork in France, nor with us, till we meet with the Eleanor grille in Westminster Abbey, made by Thomas de Leghton in 1294 [fig. 71]. This is a close copy of a grille once in Saint-Denis; and, being a known English production, it seemed to afford safe grounds for concluding that England led



FIG. 71.—THE ELEANOR GRILLE, WESTMINSTER ABBEY, BY THOMAS DE LEGHTON, A.D. 1294.  
(From a photograph.)

the way in this type of work, and that it passed, like the earlier English ironwork, from us to France. The argument seemed tenable from every standpoint, particularly from the fact, that in such hinges as those of Faringdon and Uffington, we appeared to possess links in its development, and in the Sempringham and several other hinges, to be able to show early strivings after this effect. The desire to push a favourite theory, and one so consonant with patriotism, to its utmost conclusions, biassed my judgment, but I wish to recant my earlier opinions now. I am compelled to believe that the use of ornament in relief in ironwork, instead of merely incised ornament as previously, originated in the Île-de-France, among those pioneers of Gothic architecture



who brought it to perfection. The change consisted in striking the hot iron into prepared dies, as wax is pressed into a seal, and in designing the ironwork with the same minute care that was given to other details, such as the carving and the stained glass. The secret of using prepared steel, or chilled iron, dies must have been jealously kept, since we find that it took many years to reach England, and never reached Germany, notwithstanding that the German smiths continually strove to imitate the richly foliated hinges of France. Neither did it even reach any of the other provinces or independent duchies in France, except in a few isolated cases,—much less either Italy or Spain.

From the identity of the stamps and forms used by Thomas de Leghton, we can only conclude that he had been to France and fathomed the secret for himself. Though apparently so simple, when we know how it was done, it is not a method that would be likely to occur spontaneously to a smith; and one of the most celebrated in France, under Louis XIII., could only regard the Notre-Dame hinges as castings, and produced by an art which he lamented should be utterly lost. We know nothing of De Leghton, and only identify him with Leighton Buzzard because there are hinges on the church-door there by the same hand. Out of fifteen known specimens, however, of this work in England,

three are in Bedfordshire. Three others—Colchester, Norwich, and Tunstall—could have been taken in one itinerary; though at Tunstall there is only a door-handle [fig. 72] which could have been sent without needing the smith's presence; the others, at Windsor, Oxford, Lichfield, and York, could have been done in another tour; the London one, we know, involved a special journey, for which the smith was paid his expenses; and the small aumbrey door-hinges [fig. 73] at Chester could have been despatched by road. The whole of this work in England could easily have been executed by one smith, and the strong likeness the pieces bear to each other renders it extremely probable that this was actually the case. They are all formed of easy scrolls, flowing one from the other, and which rarely complete a second whorl. The



FIG. 72.—DOOR AT TUNSTALL CHURCH, NORFOLK.

leaves that spring from the whorls spring invariably from the outer edge of the curve only. The stamps consist almost solely of a few sizes of rosettes, the symmetrical thirteenth-century vine leaf, more rarely of a trefoil leaf, and a bunch of grapes. The same small dragons' heads are introduced in all, and the collars or fastenings are the same in all. Nothing but the vine is used, except on one of the cope chests in York Cathedral, where the vine had already been used on the two Chapter House doors and the fellow cope chest. To escape monotony, something like a corn-stalk was substituted. The small door-hinges at Chester [fig. 73] are particularly delicate, some of the trefoil leaves measuring but half an inch in diameter.



FIG. 73.—DOORS TO AUMBREY, OR VESTMENT PRESS, IN THE VESTRY, CHESTER CATHEDRAL.  
(From a drawing by G. H. Birch, F.S.A., Associate.)

The treatment of the Tunstall door [fig. 72] is quite unique in stamped iron, and I have met with no parallel to it in France. It consists of two narrow plain strap hinges destitute of ornament, while the entire space between them is occupied by a most elaborate cruciform handle-plate [fig. 74], of delicate branching scrolls, ending in the usual leaves and rosettes. The ironwork [fig. 77] lining the inside of the east doors of St. George's Chapel, Windsor, which was brought from the Chapel of Henry III., consists of a large vesica-like diaper filled with ornament. The only work met with on village-church doors that can be attributed to De Leghton, except Tunstall, is to be found in Bedfordshire; and two examples are given, from Leighton Buzzard [fig. 75] and Eaton-Bray [fig. 76]. A third is at Turvey.



Not to weary you with details, the Bedfordshire hinges [figs. 75, 76] are the simplest examples, and the St. George's Chapel door-lining [fig. 77] is the richest. Small fleur-de-lis are mixed with the leaves at Norwich. The Merton College hinges are the only ones in this smith's style, retaining the crescent form. The Colchester specimens have disappeared or cannot be discovered. The Lichfield hinges have been restored, the new work having leaves growing from both edges of the volutes, which to a practised eye gives them an incongruous effect. Before quitting the subject I may say that I have had the privilege of reproducing the Eleanor Grille [fig. 71] for the Science and Art Department, and that the cost of repeating it was exactly the same as the original cost, regard being paid to the relative value of money. There are probably some muniment chests of the same work, but I have only seen those at Westminster, which are of small importance. The work is as sharply severed from what succeeded as from what preceded it; and it does not appear that this was from want of appreciation, so much as from inability to execute it. At Malpas Church and other churches we have chests covered with an imitation of the design, done as well as it could be in the absence of stamps. The hinge-work of De Leghton in England was succeeded, or more probably accompanied, by somewhat slender hinges that branched copiously into leaves, beaten out almost flat along one edge, and with something of the simple outline of the peascod. Their occurrence at Market Deeping, associated with rude attempts at bunches of grapes, shows that they also were at first intended to represent the vine. This thirteenth-century Deeping example preserves the crescent form, and furnishes one of the last instances of a rude human or fiend's head lurking among the foliage. It is otherwise not very different from the early fourteenth-century hinges in Lincoln Cathedral [fig. 78] or those at Caistor. As a rule, this kind of hinge is much simpler, as at Spalding, Whalley, Kirkstead Abbey, Penton-Mewsey, or Inglesham, branch after

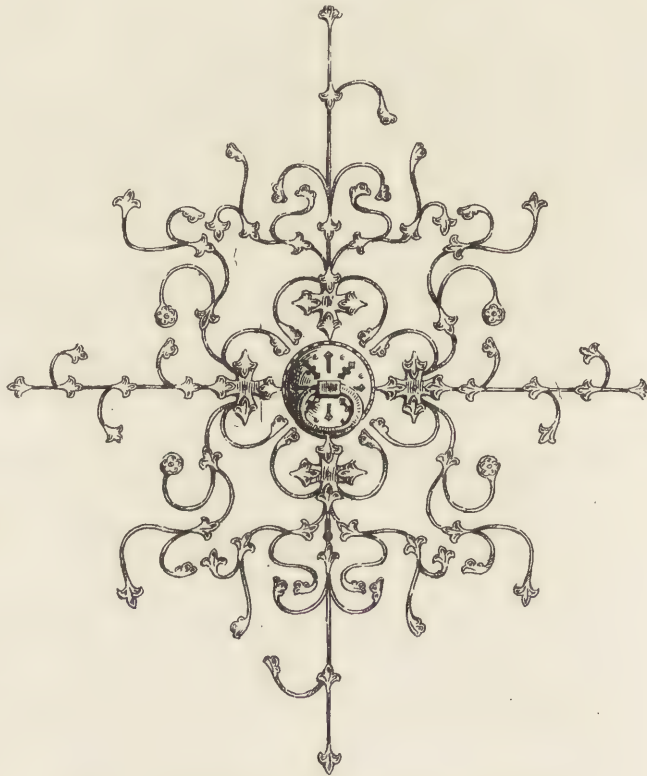


FIG. 74.—HANDLE FROM TUNSTALL CHURCH, NORFOLK.  
PROBABLY THE WORK OF DE LEGHTON.

branch being apparently shed until nothing remained but a mere strap with foliated end. Of this kind, nothing could be more exquisite than the hinge to the triforium door at Westminster. A coarser type, with shorter and much broader-bladed leaves, still of the peascod character, existed in the south, as at Little Greenstead, Maresfield, Saffron Walden, Butleigh, &c. These apparently developed into the strap

with a peculiarly broad-bladed and vigorous kind of lily-like end, seen at Bampton, Etchinghampton, &c. Finally we had a few beautiful hinges at Burford and Abbeydore—for a knowledge of which I am indebted to my lamented friend, the late Mr. Sedding—which were directly inspired by those of Worksop Priory.

The ornament in all these types seems to have suggested the fleur-de-lis, an emblem greatly endeared to us, the more so as our hold on France was relaxing. Also the pronounced leaning to geometrical, or, in hinge-work, bisymmetrical forms, which we shall see in the grille-work, now becomes dis-



FIG. 75.—DOOR-HINGES AT LEIGHTON BUZZARD CHURCH, BEDFORDSHIRE.  
(From a photograph.)

tinctly apparent, as shown in the Beaulieu, Howden, Wiston, and other examples. All soon afterwards settled into the definite fleur-de-lis-ended strap, simple, or, as on the Lockinge or Monks-Sherborne doors and many parish chests, complex, which, in England, only died out with Gothic architecture.



There is a curious instance of the revival of the old stamped work a century or so later in the hinges at Hal, of one of which we have a cast in the South Kensington Museum. We have similar instances to this in the hinges at Hunstanton and Cley (the former of which have disappeared), where a local effort was apparently made to reintroduce the rich hinge-work of the thirteenth century, in the fourteenth; and a still more remarkable one in the celebrated Dartmouth hinges, dated 1635, where the lions and leaves are modelled in bold relief, with a very mediæval feeling. Other hinges of the same type are recorded as having disappeared in Dorset; and we have to lament the disappearance of instructive examples, which were figured in text-books, from Filby, Wootton, Northfleet, and a host of churches throughout the country, within the last thirty years.

There is very little early ironwork in Belgium, the wealth of the country having led to so much rebuilding as to cause it to disappear. The grilles protecting the municipal archives at Bruges, and perhaps the straps fringed with trefoils on the doors of the Hôtel-de-Ville at Brussels, are the only instances I can remember of work so old as the fourteenth century. Germany, on the other hand, possesses many specimens which may belong to the fourteenth century, if few that are older. Among the oldest may be reckoned the closing grilles to the sacristy at Hildesheim, consisting of small



FIG. 76.—DOOR-HINGES AT EATON BRAY CHURCH, BEDFORDSHIRE.

(From a photograph.)



scrolls, ending in flattened and pierced leaves or flowers, and obviously intended to imitate the stamped grilles of France [fig. 79]. Then we have the scroll and grooved iron hinges to the Church of St. Magnus, Brunswick, figured by Hefner-Altenek, probably



FIG. 77.—DOOR-LINING AT ST. GEORGE'S CHAPEL, WINDSOR.



FIG. 78.—DOOR IN LINCOLN CATHEDRAL.

(From drawings by Mr. O. Albrow, in the South Kensington Museum.)

of the thirteenth century; some hinges to the tower-door at Kaisheim, near Donauwörth, and to the Church of St. Ursula at Cologne. The latter are much like those from Le-Puy. So far these are merely isolated and independent examples, associated with Romanesque architecture in a country which until then had shown a preference for



the use of bronze. Iron hinge-work only really came into fashion in Germany when Pointed architecture was thoroughly established there. The designs were based on the ironwork associated with the grandest Gothic Cathedrals of Northern France, and consist of rich and highly conventionalised foliage. Some splendid examples are given by Staats and Umgevitte in their *Gothic Model-book*, such as those at Marburg, Meissen Cathedral, Neukirchen (Hesse), &c. I can show you one of these from Magdeburg [fig. 80], which has become more Germanised than the others just mentioned, and is said to be of the thirteenth century. Though the leaves are narrow and deeply indented, they are intended to represent the vine. Indeed, the vine as used in smithing is a Protean plant, and, were it not that the fruit and tendrils are so often introduced, it would be quite beyond our powers of recognition. After passing through numerous conventional forms in Germany, it settled into the flat lozenge-shape leaf, cleft so deeply as to form a quatrefoil. Fig. 81 is an example, from Gailhabaud, representing the doors of Schloss Lahneck on the Rhine. There are over 250 leaves on the hinges, which, trained across the door like espaliers, almost cover them. The hinge I will next show [fig. 82] is said to have come from the door of an English church. Like the last, it is German work of the fifteenth century, and shows very clearly the peculiar features of the hinge-work there at that time. Perhaps the most superb example in Germany is at Erfurt [fig. 83], where the inside of the doors is covered with a diaper, rich in rosettes, leaves, and armorial bearings, and the outside with scrolly hinges bearing unusually realistic vine leaves. Another grand example, at St. Elizabeth's Church, Marburg [fig. 84], has trident-shaped hinges, the upper of which bear each more than fifty cinquefoil vine leaves, while the lower carry about forty vine leaves of the traditional English thirteenth-century outline. It is perhaps early fourteenth, while the Erfurt hinges may be fifteenth century. This work is all highly interesting, as being a purely German development from French originals, before the Flemish influence came in to disturb it.

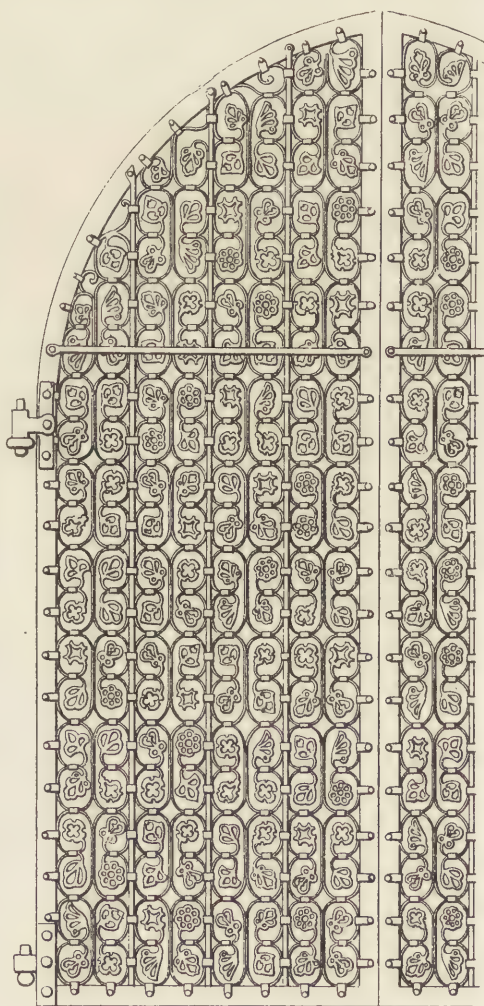


FIG. 79.—IRON GRILLES AT HILDESHEIM.

We have now traced not only the use of stamping, but the use of the vine, in hinge-work, from its origin in France to its final disuse in Germany. It commenced by borrowing an ancient and a highly conventionalised Greek form, much used in



FIG. 80.—HINGE-WORK AT MAGDEBURG.



FIG. 82.—HINGE-WORK, FIFTEENTH CENTURY.



FIG. 81.—HINGE AT SCHLOSS LAHNECK.

(From Gailhabaud.)

Byzantine architecture and ornament, in decorating Anglo-Saxon manuscripts, and in Norse carving; after which it passed through nearly a score of distinct conventional types in different countries. In following it to its conclusion I have been led to slightly anticipate, and must now return to the thread of the story.



Our only references to Italy, hitherto, have been negative ones, for Italy had always preserved the traditional Roman and Oriental preference for marbles and bronze where it was possible to use them. In Venetia we occasionally see an open-work marble or wood design translated into iron, but it was only when Gothic architecture penetrated into Italy that we see iron grilles or hinges deliberately introduced. The grilles were almost uniformly rectangular panels filled with quatrefoils, and they first appear early in the fourteenth century. The panels were large or small, the quatrefoils simple or greatly enriched at the points; the crestings were deep and narrow, with plain-toothed cornices, or rich with foliage and armorial bearings; the spikes were simple tridents and spikes, or clusters of realistic flowers or conventional fleurs-de-lis. Out of these materials a surprising variety of design was obtained, aided, however, by tracery in the door of the Santa-Croce screen [fig. 85], and by the introduction of the family badge in the latest of the Scaliger tomb-rails. These grilles were confined to North Italy, where Gothic architecture existed; but after little more than a century we find iron again falling into disuse: the quatrefoils reproduced in bronze and still further enriched by mouldings in bronze or in bronze and marble. Smithing was, in fact, always an exotic in Italy, and when Gothic architecture ceased there, only the easiest and feeblest work was done, with the solitary exception of the torch and banner holders by Niccolo Grosso, chiefly found on Florentine and Sienese palaces, dating from towards the end of the fifteenth century. This early Italian work, together with the glories of the East, made perhaps a profounder impression on the smith's art, through his patrons, than on any other. The quatrefoil forms crept to us through France, and were at first reproduced, it would appear, from hearsay or description, and afterwards more faithfully. A grille at Langeac has the quatrefoils arranged in diagonal, instead of straight rows, as in Italy. This was corrected in later examples. In England there are remains of quatrefoil grilles in the Cathedrals of Wells and Chichester; but English grilles, unfortunately, may be all together nearly counted on the fingers of both hands.

We possess, however, two much more important specimens of grilles, inspired

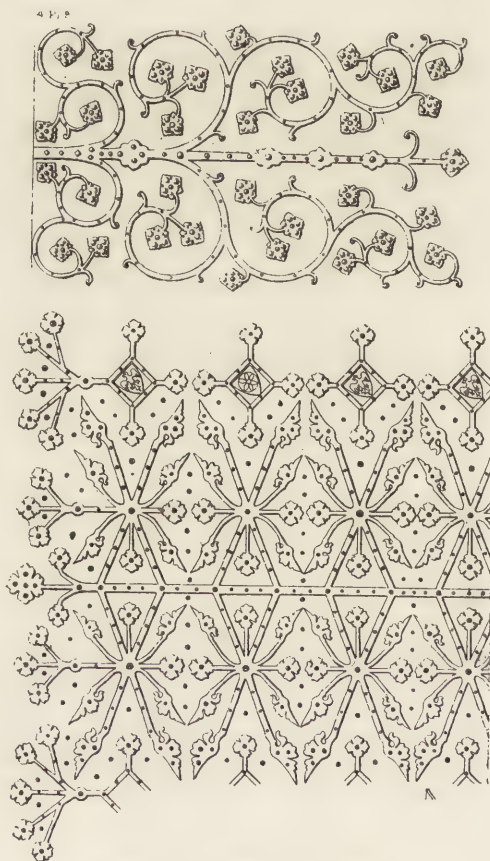


FIG. 83.—HINGES AT ERFURT.

directly by Eastern joinery, in the choir-gates of Canterbury Cathedral, which are taken from a wooden lattice; and in the gates to Henry V.'s chantry at Westminster Abbey, made by Roger Johnson in 1428. The design of the latter gates occurs in iron at the Puy-en-Velay, in wood at Saint-Pierre, Caen; and often in stone. The general effect is not vastly different from that of the quatrefoil grilles of Italy, and we can hardly help connecting the traceried top of the chantry-gates at Westminster Abbey with the traceried door of the Santa-Croce grille [fig. 85], which was made half a century earlier. Very few grilles of this period exist in England, and all the rest

are extremely rude and clumsy, affecting traceried forms.

The hinge-work of the fourteenth century is, as a rule, very plain, but sometimes, like the hinge in Westminster Abbey, remarkably graceful. Handles, escutcheons, &c., abound, and continually betray their Eastern derivation. One from Rendcombe Church, Gloucestershire, has arabic figures and letters. In the fourteenth century the tomb-rails made of vertical bars first appear, and were probably, as in the case of that of the Black Prince, added to existing tombs, as well as erected round new tombs. They were very massive, and always without horizontal bars, which would assist the climbing of them—their ornamentation being confined to a battlemented cresting. The standards were massive and carried up in the form of turrets, which at first



FIG. 84. —HINGE-WORK AT MARBURG.

bore prickets for candles. Later, the vertical bars were carried up into spikes, and the standards carried crests. One of the richest of these railings is round the Fitz-Alan tomb at Arundel, made in 1415. They became so numerous, and were so very plain, that old views of Canterbury and Westminster, showing them in perspective, appear like long vistas of cages, so that they were usually omitted in illustrations of interiors. Perhaps the most remarkable extant are the rails to the tomb of Sir Thomas Hungerford in Farley Chapel [fig. 86], which have most florid heads to the standards and spikes, and those to Bishop Bekynton in Wells Cathedral, by the same designer. It is very interesting to trace the development of these tomb-railings, which seem



almost peculiar to England ; as we possess them of every date, each with its own style, down to about the middle of the seventeenth century. They are of little importance, however, in the history of the development of ironwork as a fine art. Indeed, whether



FIG. 85.—IRON GRILLE AT SANTA-CROCE, FLORENCE.

from inability to discover the process, or from change of fashion, English smiths did not seriously strive to emulate Thomas de Leghton.

The deathblow to smithing in this country seems to have been given early in the fifteenth century, when nothing but the impossible joinery patterns, and

vertical bar railings, were demanded from smiths, who felt perhaps that they had merely mechanical tasks to perform. The same causes produced, to a certain extent, the same results in France, where, however, the locksmith and armourer continued to make ironwork of the most beautiful character; and smithing might have ceased to exist as a fine art, had not the astute trading communities of the Low Countries taken up zealously the industry that their powerful neighbours were relinquishing. The vigour with which they threw themselves into their new industry is displayed in the monster welded guns, three of which survive at Bâle, Ghent, and Edinburgh; in the beautifully moulded constructive ironwork in the spires, &c., of Bruges, Ghent, and Antwerp; the massive rails in the market-place at Mechlin and Xanten; the baptistery and treasury grilles, well-covers, and belfries, seen not only in Belgium and the adjacent parts of Germany and France, but in Burgundy and more distant countries. Nothing

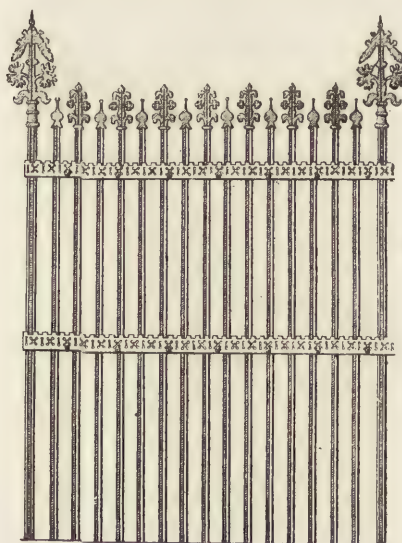


FIG. 86.—IRON RAILING ROUND THE HUNGERFORD TOMB, A.D. 1411, FARLEY, SOMERSET.

is more eloquent of the force that was put into the work than the stamped hinges of Hal, which seem to have been produced early in the fifteenth century as a mere *tour de force*, since no others exist and they are foreign to the prevailing style; but their massiveness and relief is extraordinary, and far greater than any produced when the style was at its zenith. Smithing was brought, however, to its highest perfection in the Low Countries by the Matsys family of Louvain. The splendid career of the father as architect and smith is now well known. Though some of his best works have been allowed to perish, we have at least one that is authentic in the Louvain font crane, which shows a particularly bold and, for the time, original treatment of leaves. The celebrated Antwerp well-cover, dated 1470, must have been made subsequently, and shows a further elaboration of

the new combination, inaugurated in France, of leaves made of iron beaten thin, with massive architectural buttresses and tracery. We have a work of the same school in the gates closing Bishop West's Chapel in Ely Cathedral, but in these the leaf-work is replaced by flowers. I am also constrained, after most careful research, to consider the traceried gates with their piers and cressets, in St. George's Chapel, Windsor, as Louvain work, if English in design [fig. 87]. I could not discover any of this peculiar traceried ironwork *in situ* elsewhere in Belgium, though at Louvain an abundant use was made of it, especially in the Cathedral; while the unique renown acquired by the Matsys family justifies us in regarding it as probable that such an important commission from abroad would be entrusted to them. The work is constructed of an enormous number of pieces, mostly filed from the solid, bolted and riveted together, with the aid of little, if any, fire. Richness is given by a backing of two or more thicknesses of pierced sheet-



iron. In addition to the locks, caskets, and *guichets*, fine examples of which are to be found in this country, folding lecterns, candelabra, coronas, and even pulpits, and hersees and catafalques, were made for use at home and abroad. There are exquisite examples of the coronas at Louvain, Ghent, Hal, Zutphen, &c., which are photo-lithographed in the monumental work on Belgian archæology by M. Van Isendyck.

Though we have barely glanced at it, it is impossible to over-rate the influence that the energy of one or two towns in particular, Louvain and Brussels, and perhaps of one family, had on the destiny of the blacksmith's art. If, owing to the distracted condition of our country, it failed to effect its revival here, it perhaps kindled anew the smiths' fires in France, and led to the production of those beautiful pierced tracery treasury grilles at Rouen and Evreux, and those sumptuous locks which are the glory of the Cluny Museum and many a private collection; and of which so superb a collection was brought together at the Trocadéro some eighteen

months ago. It also led to the grandest epoch of smithing the world has ever seen, the period when those vast *Réjas* were reared in Spain to a height of seventy feet, every one of which required labour of so arduous a character that it can hardly be realised,

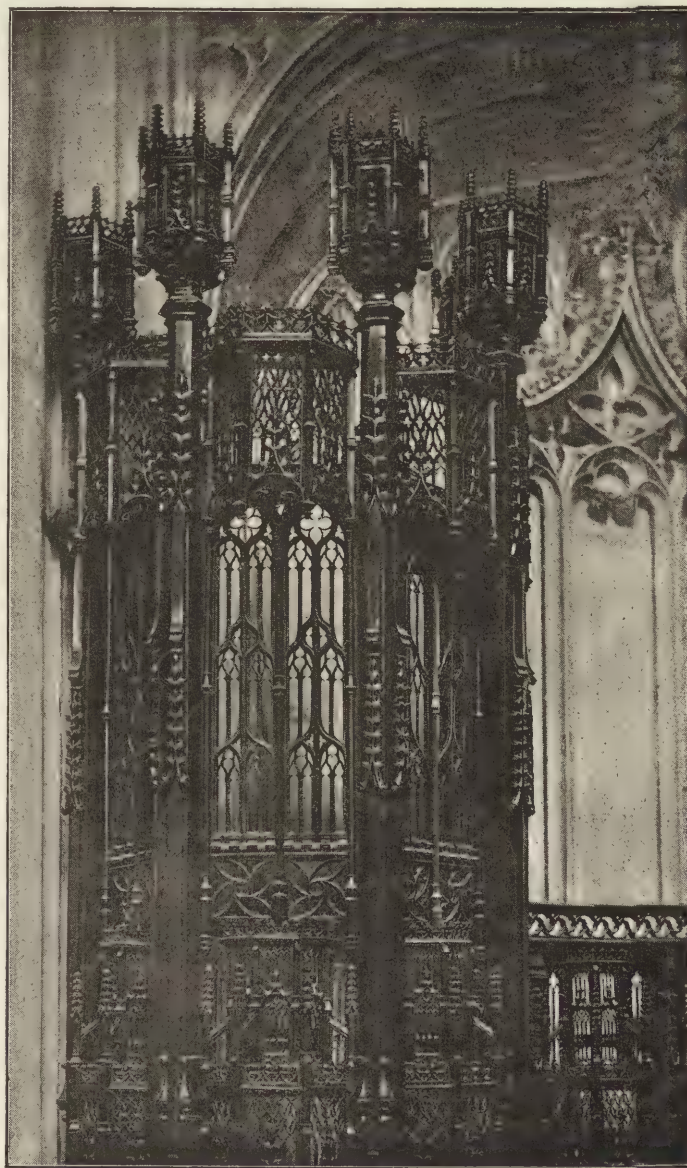


FIG. 87.—THE UPPER PART OF ONE OF THE WROUGHT-IRON GATE PIERS  
IN ST. GEORGE'S CHAPEL, WINDSOR.

(From a photograph.)

and which was only surpassed by its artistic skill. It also revolutionised smithing in Germany, where we saw that a school was already in process of developing from the French twelfth- and thirteenth-century stamped work. The new Flemish styles invaded the German frontiers at all points, and the border towns can boast of as many specimens as Brabançon itself. The art leapt immediately to Cologne, which had so much in common, and such close ties with, the trading cities of Flanders. The endeavours Cologne made to compete with them are obvious, for we meet there with the only one of those massive font cranes, otherwise peculiar to Belgium. Its feeble tracery and defective mechanism, however, show it to be the effort of an apprentice-hand. Then at Cologne we have the curious *rastellum*, the bell-holder of St. Cunibert's, the lantern and bracket [fig. 88] at the Hôtel-de-Ville, the bracket at Plückhof, the



FIG. 88.—LANTERN BRACKET AT THE HÔTEL-DE-VILLE, COLOGNE.

grille at Gross St. Martin's, and other examples, which show that the smiths of that city were bent on acquiring the particular style, characterised by its mixture of tracery and beaten leaf-work, which was developed in Belgium.

The Cologne work is distinguished from that which preceded it in Germany, by the constant use of the thistle in all but the earliest pieces—a plant I only know used in one instance with us, in the choir-gate hinges at Wells. Whether the designers supposed the richly cut and wrapped leaves of the Louvain crane and the Antwerp cover to be intended for thistles, or whether the fine form of the plant and its religious association led them to spontaneously select it, cannot be known; but the flowers, buds, and leaves of the plant begin to appear among their traceried iron from the begin-

ning of the sixteenth century, and spread thenceforward over Germany, as rapidly as the plant itself is propagated over pastures new by its airy thistledown. It immediately ousted the vine, and as effectually as its original has ousted the indigenous plants of countries cursed by its introduction; for a century no ironwork of any pretension was forged in Germany into the composition of which the thistle did not enter. In the modelled leaves the spirit of the Antwerp well-cover is clearly discernible, but when used as a pierced ornament it runs into a rich arabesque, and often its derivation could hardly be traced without the connecting links. The coronas at Magdeburg, Kempen, and Vreden, are exquisite specimens of the various directions in which the thistle ornament became developed. Sometimes an occasional thistle-head will alone represent it in a composition, but more often every part of the design is an adaptation from it. It



formed the basis of all the pierced sheet and lightly embossed seaweed-looking ornaments applied to locks, hinges, and handles, which were tinned and applied over red paper or leather. In German hands the thistle, like its predecessor the vine, became Protean, and simulates the oak, the fan, the Eastern spathe, the fleur-de-lis, the cross, or mere tracery. The thistle led up to the still more elaborate passion-flower, another plant of mystic import, which was just appearing when the Renaissance arrived to free the German smith from all traditional forms, and to open the way to the thousand grotesques in which he revelled for another century. In like manner, the rich threaded work which everywhere accompanies the passion-flower, was derived from the threaded lattice grilles of other countries. The grandest examples of threaded work are at Cologne, Aix-la-Chapelle, Magdeburg, and Innsbruck.

The Renaissance brings me to the conclusion of my Paper. I feel that my apologies are due for having attempted so wide a range of subject, which we could only hastily skim over, when the time would perhaps have been more profitably spent on a narrower field. My anxiety to bring as much new matter before you—for I have met with no attempt even at a sketch-history of ironworking in any language—must be my excuse; though in treating the subject from its developmental and historical aspect, I fear I may have disappointed many who would rather have listened to a practical discourse on the technical side of the subject.

J. STARKIE GARDNER.

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\* \* The Discussion [see verbatim report in *The R.I.B.A. Journal*, Vol. VII., pp. 173-176] of Mr. Starkie Gardner's Paper was opened by Mr. William White, F.S.A., and continued by Mr. Charles Fowler, Mr. James Neale, F.S.A., Mr. Ralph Nevill, F.S.A., Mr. H. H. Statham, Mr. R. Langton Cole, Mr. J. Macvicar Anderson, and the President. A brief abstract of the remarks made by some of the speakers and of Mr. Gardner's reply here follows:—

MR. WM. WHITE, F.S.A., *Fellow*, considered Mr. Gardner's collection of representations of ironwork most comprehensive and interesting. Though he could not entirely agree with Mr. Gardner as to the Winchester grille [fig. 66], it showed in the tapering of the ironwork one of the greatest elements of the smith's power—the work of the hammer and the forge, and indicated a mastery over the material not exhibited in the later specimens of stamped work. He had himself seen very fine specimens of mediæval ironwork at Siena and elsewhere in Italy. He remembered one door which had a succession of iron bands, one over the other, locking three or four locks. In Switzerland, also, there was a considerable amount later in date, but following closely on the mediæval precedents. At Lucerne Cathedral there was a very fine screen of beautiful workmanship; and at Copenhagen there was a wonderful piece of work in a balcony round the top of the Church of the Holy Trinity, of date, he thought, early in the sixteenth century. Something had been said in the Paper about human skin being found on the doors of churches under the hinges; and he believed that the skin was simply to prevent the iron making black stains, which the acid of the oak produced on its surface when in contact with the iron.

MR. CHARLES FOWLER, *Fellow*, drew attention to a class of work dated up to about the end

of the sixteenth century, of which a good deal was to be found in Southern Germany; its peculiar characteristic was that the scrolls were very large, with a great number of turns, and but little leaf-work. It was almost entirely made of round iron; the bars were passed through each other, and not welded together. The panels were crossed by diagonal rods, which passed through the several scrolls so that the diagonal passed through every turn of the scrolls.

MR. RALPH NEVILL, F.S.A., *Fellow*, was pleased to hear that Mr. Gardner ascribed the origin of this art rather to Norsemen than to Celts. He (the speaker) considered that most art came in with the Norsemen and the Danes, who did not originate it, but obtained it from Byzantium and the Greeks. That there was only one reproduction of English ironwork at South Kensington Museum ought to shame the country; a strong effort should be made to induce the authorities to get together a good collection of English Ironwork, which was equal to any in the world, and more suited for English artizans to get ideas from than that of other countries.

MR. H. H. STATHAM, *Fellow*, was struck by the almost entire absence of anything like realistic treatment of natural forms in the long series of illustrations which Mr. Gardner had exhibited to them. The big German thistle was "the horrid example." Other illustrations had shown the treatment of ironwork on scrolls tangential to each other, but without any imitation of natural form—a lesson much wanted in the present day. In recent ironwork he had noticed that an admirable piece of work would be designed entirely free from realism, as at first appeared, but the temptation to stick in little realistic leaves and tendrils somewhere could not be overcome. He could understand a man absolutely imitating foliage in ironwork, because, though miserably misled, he was consistent; but he could not understand a man avoiding realism for the greater part of his work, and then spoiling the whole effect by a bunch of flowers or fruit. That was joining two methods which had no relation to each other, and was greatly to be deprecated. He thought that any one who felt it strongly should exhort those who worked in iron to design the work so as to keep it at least in one plane; and that when they had made a conventional design, they should leave it so, and not put in imitations of natural branches.

MR. J. STARKIE GARDNER said that his Paper stopped at the Renaissance, and it was just then that the threaded work began; perhaps the grandest example being round Maximilian's tomb at Innsbruck. He thought that realistic foliage should not be introduced into design, nor subjects taken straight from nature. They had to be idealised to be of any use. He hoped a day would come when the largest court at South Kensington and one of the best galleries at the British Museum would be given up to English art, for few of them knew what English ironwork was. The habit of putting skins under the hinges had been in vogue from the tenth century; and they were evidently, at times, human skins, for he had ascertained that doors lined with human skin were known to have existed at Worcester, Rochester, Westminster, Copford, and Hadstock.



LXXXI.

THE FALL OF ONE OF THE CENTRAL PILLARS  
AT SEVILLE CATHEDRAL. By Mr. SOMERS CLARKE, F.S.A.

Mr. Alfred Waterhouse, R.A., *President*, in the Chair.

MR. PRESIDENT AND GENTLEMEN,—

HAVING business at Malaga, I was asked by the Council of the Society of Antiquaries to visit Seville and make a report upon the terrible collapse which occurred but shortly before my journey into Spain. In the early part of 1890 I read my report\* to the Society of Antiquaries. Architectural technicalities were, of necessity, excluded from this communication. I have now been honoured with the request to read a Paper on the same subject to you, and feel that before this audience it is permitted to enter upon matters of construction and upon architectural subjects which would have been out of place in the first case, and will not, I hope, be tedious in this.

It will be as well, first of all, to give a short history of Seville Cathedral, one of the most magnificent and majestic buildings in the world. Its history is to some extent mixed up with peculiarities of plan.

The cathedral covers the site of a mosque. The plan of mosque used in Spain was in the case of Seville, as may still be seen at Cordova,† a great rectangle inclosed by lofty walls of dried mud, fortified by buttress towers at intervals, and battlemented. The north part of the rectangle thus inclosed formed an open courtyard planted with orange trees, and with a fountain in the middle for ablutions. The south part was covered in, forming a series of parallel aisles, their main axis running north and south. The aisles were open at their north end to the court. At Cordova the whole thing remains with modifications. At Seville a great part of the court of the mosque with the inclosing wall remains.

From the position of the great tower, the Giralda, it is not unreasonable to sup-

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\* See *Proceedings of the Society of Antiquaries of London*, vol. xiii. 2nd series, pp. 72-81.

† See *TRANSACTIONS*, 1882-83, pp. 101-16, for a Paper by Mr. R. H. Carpenter, F.S.A., on "The Mosque-Cathedrals of Cordova and Seville and some contemporary Arabic Buildings." His description of Seville Cathedral is given on pp. 110-12 of that volume.

pose that the cathedral occupies very exactly the site of the covered part of the mosque. The courtyard has been encroached upon by various buildings, but a large open area is still left, with its fountain and orange trees. The mosque here, as at Cordova, was used after the conquest, about 1250, for the cathedral.

The early modifications of the mosque at Cordova to suit it for its new uses are very interesting, more particularly the way in which the orientation was got, in direct opposition to the natural axis of the aisles, which, as has been already stated, is north and south. So far as I know, there is not documentary evidence to tell us what was done at Seville to suit the mosque to the purposes of a church; but we know that in 1389-90 various additions and repairs were made. These do not seem to have been very satisfactory, as on the 8th March 1401\* a resolution of the Chapter was formulated to build an entirely new cathedral,—such a church, and so magnificent, that it should not have an equal. Towards the cost of it, it is said that the prebendaries gave up their incomes, reserving but just sufficient to live upon.

In 1403 the work was begun, and went on for fully a century. The scheme was truly magnificent, for not only is the area covered so great that it renders Seville Cathedral one of the largest, if not the largest church in the world, except St. Peter's at Rome, but the dimensions of its parts, its height and width, are colossal. The name of the architect is not known. At the time the work was undertaken Seville was a very great and prosperous city, probably the most important in Andalusia—a province to which few English travellers penetrate compared with the number who make their way to Italy, France, or Germany. It is necessary, therefore, to describe the cathedral at Seville; and I must ask those who have visited it to bear with me whilst I recount what they already know, for without a description it will not be possible to appreciate either the greatness of the building or the extent of the catastrophe.

It is said that the plans of the church were preserved at Seville, but were removed by Philip II. (1556-1598) to Madrid, where they were unfortunately consumed by fire at the destruction of the old palace, 24th December 1734. A set of plans † was prepared for the Cardinal Delgado by Miguel Fernandez in 1776, and engraved by Joaquin Ballester. That truly magnificent work, which is being produced at the cost of the Spanish Government, the *Monumentos Arquitectónicos d'España*,‡ and which through all changes and political troubles continues in a sedate and leisurely way to be issued, has not yet, I think, included the Cathedral of Seville. The mass of timbering that has recently been erected throughout the church has given an unexampled opportunity for accurate measurements to be taken, and we may venture to hope that this oppor-

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\* *Viage de España*. Antonio Ponz. Tom. ix. p. 3. Madrid, 1780. But Cean-Bermudez, in his *Descripción artística de la Catedral de Sevilla*, 12o. Seville, 1804, p. 20, says that the extract, "Que se labre otra iglesia "tal é tan buena, que no haya otra su igual," is dated 8th July 1401; and he uses it as a motto on page iv, with the reference, "Auto capitular de 8 de Julio de 1401."

† Cean-Bermudez. *Ibid.* pp. 170-1.

‡ This huge work, which was commenced by Royal Decree in 1856, is magnificently illustrated. Three volumes of text in Spanish and French, and five of Plates, temporarily bound, are in the Library, and subsequent Parts have been added as they have appeared, the publication being necessarily slow.



tunity has not been lost, and that Seville Cathedral will soon be added to the list of those already produced in that work.

As has been already stated, the cathedral church is rectangular on plan. It covers an area some 400 ft. long and 280 wide. It consists of a great nave of five bays, the crossing, and an eastern limb of three bays. The nave and eastern limb of the cross are flanked by two aisles on either side, the external aisles being flanked on their outer sides by deep chapels, filling in the space between the buttresses. Nothing can be simpler than the plan. The transepts do not project beyond the outer line of the chapels. The east wall is treated in a similar way to the side walls, with chapels between the buttresses; the centre of this line is, however, broken by the *Capilla real*, a building of later date than the original church. The plan here inserted [fig. 89] must be accepted as little better than a diagram. I have not been able to find in England any copy of the engraved plans by Ballester above referred to.

It is clear that the rectangular inclosing line of the mosque has been the inclosing line of the church. The rectangle has been extended on the south by the addition of sacristies, chapter-houses, &c. To the north-east corner of the church is attached the great Moorish brick tower called the Giralda.

Of the five bays of the nave, the two easternmost are occupied, after the Spanish manner, by the enclosed *Coro*. The crossing is open. Two of the three bays east of it are occupied by the *Capilla mayor*, with the high altar and its sacristy behind it, the third and easternmost bay serving as an aisle behind this sacristy, and now giving access to the *Capilla real*. The plan is typically Spanish, but differs from most of the great churches in having a square east end, and not an apse. The typically Spanish plan is one with a very rectangular outline, the points of support, in process of time, growing farther apart as compared with Northern Gothic

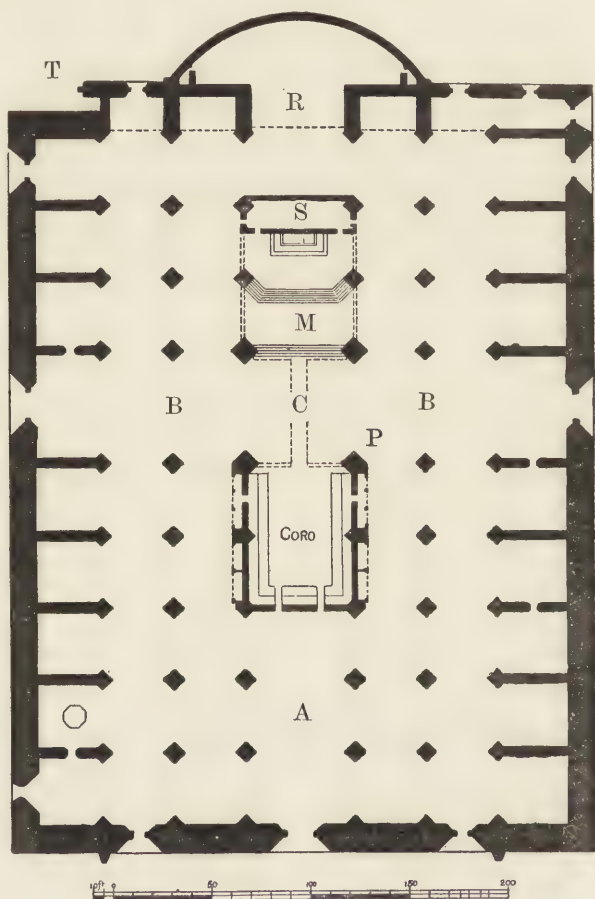


FIG. 89.—SKETCH-PLAN OF SEVILLE CATHEDRAL.

A, Nave; B B, Transepts; C, Cimborio; M, Capilla mayor; R, Capilla real; S, Sacristy of Capilla mayor; T, Giralda tower; P, Pillar that fell in 1888.

buildings. A square east end is not of the essence of this type of plan; but, on the other hand, such a type seems very readily to yield itself to such a style of east end.

Whether a square east end is more or less customary in Andalusia is a question that may fairly be asked. According to my recollection, many of the parish churches in Seville are square-ended; indeed, I cannot recall one with an apsidal end. The choir, inserted into the mosque at Cordova, has a square east end. In that case, the Moorish building is so light in its construction, and so much smaller in its subdivisions than the Plateresque insertions, that the latter derive no support from the former, and were not much ruled by it. An apse could as easily have been inserted as a square end, but the square end is preferred. Then, to sail across the ocean, the Cathedral at Las Palmas, the ecclesiastical capital of the Canary group, and built 1450-1550, has a square east end. The site is quite free. The type of building is absolutely Spanish, and by the hand of an able Castilian architect, Diego Alonso Motaude.

It is not improbable that the taste for the grand reredos or *Retablo* was a great factor in the building of square east ends. The *Retablo* is better displayed on a square end, and we see at Winchester that the great reredos there turns an apsidal choir into one square-ended. Buildings on Moorish lines may have set a local fashion in Andalusia. Then we must consider the position assigned in Spain to the *Coro*, and, as I believe, the modification of plan to suit that position. The early churches in Spain, especially in the north, have, as Street clearly shows, a distinctly French origin. The Cathedral of Burgos, begun in 1221, is essentially French, not only in detail, but in plan, and the choir was in the usual place under or east of the crossing. The earlier church of Santiago de Compostella reproduces the plan of Saint-Sernin at Toulouse.

Leon, which is very French in plan at first sight, is really very Spanish. It was begun somewhat later than Burgos, but I doubt whether the *Coro* was ever elsewhere than west of the crossing. Comparing it with the plan of Amiens, for example, the eastern limb does not seem of sufficient length to take the *Coro* and the altar.

The plan of Toledo, begun in 1227, is clearly intended for the *Coro* to stand, as it usually does in Spain, immediately west of the crossing. Omitting the apse, it does not seem a great step from the plan of Toledo\* to that of Seville, begun in 1403.

In the plan of Seville the building is clearly laid out for the *coro* west of the crossing. We may say that in this building the Spanish plan has become thoroughly stereotyped, and not only in the adaptation of the plan to the arrangement of the *Coro*, but in the general rectangularity, in the absence of long transepts, and in the deep chapels all round the building. The sections, too, differ from those of Northern buildings. The aisles are very lofty compared with the nave: the side chapels form a much more prominent feature in the interior than, for example, in a typical French church. The windows are very small; and as for exterior, one may almost say that a church of this sort has not got one. It is a mere heap. The view annexed [fig. 90] gives a fair

\* The Plan of the Cathedral of Toledo, with other illustrations of the building, are given in the *Monumentos Arquitectónicos d'España*.





FIG. 90.—SEVILLE CATHEDRAL, FROM THE SOUTH-EAST. (From a photograph.)

idea of the exterior of the cathedral. The spectator is standing at the south-east. The part of the church nearest to him contains the chapter-house and sacristies crowned by a dome. In the left rises the end of the south transept. The lower part of this, to a height of nearly one hundred feet from the ground, and level with the outer walls of the aisles, was left in the rough until about four years since, when a great gabled portal was begun. Over the parapet which surmounts the round window, a low gable seems to rise. This is not, however, part of a roof. The church does not show any roof above the parapet. The structure seen in the view is made of temporary boarding supporting a corrugated-iron roof, and shows that the photograph was taken after the work of repair had begun, and after the stone groining had in parts been removed. The lofty tower rising in the background is the Giralda. The dome, and lantern immediately in front of it, cover the *Capilla real*. From any point of view the exterior of the building is equally shapeless and devoid of scale.

Following more or less on the same lines of development comes the new cathedral at Salamanca, begun in 1513; and then the cathedral at Segovia, begun in 1522. Of these two, the church at Salamanca has a square east-end, although intended at first to be apsidal.

In examining these plans our attention is drawn towards a thing which has been a good deal neglected both in the study of ancient churches and the designing of new ones. When I was being instructed in the rudiments of architecture and archaeology, we were led to look upon a church, old or new, rather as a stately combination of masonry, especially of tit-bits and mouldings, than as a building which was made to accommodate itself to particular requirements. Views of buildings—ancient and modern—were, and are even now, made without showing a scrap of furniture inside, and yet the latter very truly expresses the use of the building, which is in fact the case built around the furniture. In Fergusson's *History*, how many plans of churches are shown without the choir fittings! Street, too, seems to have fallen into the same groove. I fear this mistaken view of fitting the horse to the stable, rather than the stable to the horse, is far from dead yet. When it was once decided that the people should be admitted to the crossing and transepts east of the stalls, and the body of canons and their stalls should be behind the people, common sense seems to have dictated a change of plan in the structure of the church. The Northern plan, of a long nave and numerous points of support, was given up.

In England, in Germany, and certainly throughout the North of France, the nave altar played a very important part so far as the populace was concerned. The Spanish custom seems to have changed this, and the high altar was made to serve a double purpose.

Accepting these conditions, it is evident that a large space was needed at the crossing; this involved wide spans and broad transepts, and ended in leading on to the square as against the long plan of a church; the wide spacing of pillars as against small bays. In Street's *Gothic Architecture in Spain* (pp. 16-18), an interesting and valuable description is given of the Spanish arrangement of the *Coro*; but I cannot



agree with Street in thinking it as late in date as he states. Although a very similar arrangement may be found at Westminster Abbey, it is not ancient, but dates from 1848, when the solid screens crossing the transepts were removed, and the pavement under the lantern was lowered to the level of the transepts; in fact, the object the Spaniard aimed at was also in view at Westminster, *i.e.* the nave altar having gone, to concentrate the people at the east end, about the high altar. I should state, however, that the Spanish way of using the crossing is very different from the way it is used at Westminster. There are no seats. The women in black with black mantillas, and generally armed with a camp-stool, take entire possession of the centre. The men stand in the transepts, and as the number of women increases they quietly, but very resolutely, push the men farther and farther out from the middle. The men have not a chance. An immense number of people is thus squeezed and packed on the floor. I hope you will do me the favour to accept my theory of the development of the Spanish plan, its width, its squareness, with leniency, for I fear I have speculated with but limited information as a basis; though, such as my theory is, I offer it for consideration.

Having ventured to give a reason for the system of plan, I must now describe more in detail the Cathedral Church of Seville, which is a most perfect development of this plan; and I will use Westminster Abbey Church for the purposes of comparison.

When we reflect that the nave vault of Westminster Abbey Church, the loftiest mediæval stone vaulted building we have in England, is but just higher than the aisle vault at Seville, that the bays of the nave at Seville are twice the span of those at Westminster, and that the side aisles are within a foot or two of the width of the Abbey nave, we begin to realise on how vast a scale the building is laid out. The total length from east to west of each aisle at Seville is a little in excess of the full length of the Abbey from west end to apse. The aisles of Seville consequently represent the nave and eastern limb of Westminster repeated four times side by side, and another nave much wider and higher set up in the middle. To enter into details, the following dimensions will give some idea of the immense size of Seville Cathedral. It is about 400 ft. long and 270 ft. wide inside. The nave from centre to centre of the pillars is 55 English or 60 Spanish ft. wide. The transepts are the same. The aisles are each of them 36 ft. 4 in. from centre to centre of the pillars. These aisles are double, and beyond them are chapels 27 ft. 6 in. deep. Each bay of the building is 36 ft. 4 in. from centre to centre. The lesser columns carrying the vaults of the aisles are about 10 ft. through; the greater, forming the nave piers, are about 12 ft. They are all of them at least 70 ft. high to the spring of the aisle vaults, whilst the nave vaults and the arches at the crossing spring from above the level of the crowns of the aisle vaults, at a height of about 100 ft. The crown of the nave vault is about 130 ft. above the floor, that of the aisles something less than 100. The annexed view [fig. 91], taken from a photograph, shows the interior of the building from the west. The spectator is about 40 ft. from the floor, and consequently sees over the screen into the *Coro*. The organ-cases rise on either hand, fitting in the



easternmost arches of the nave. It will be observed that the bay of vaulting over the organs and adjoining the raised vault or *Cimborio* over the crossing is decorated



FIG. 91.—INTERIOR, LOOKING EAST. (From a photograph.)

with elaborate ribs richly cusped. The three other bays of vaulting, adjoining the *Cimborio* on the N. E. and S., are similarly enriched. The brilliant effect of light immediately beyond the *Cimborio* is caused by the removal of the glass and tracery in the clerestory windows. A strong light is thus thrown on the upper part of the *Retablo*. The removal of these windows, and the presence of the pieces of timber crossing the building, show that the photograph was taken but shortly before the fall of the *Cimborio*.

It is no doubt difficult to realise that there is so immense a difference as exists between the dimensions of Westminster Abbey and Seville Cathedral, but it must not be supposed that Seville is a cold, hungry, straddling building, such as we now see the nave of Florence Cathedral or of San Petronio at Bologna to be, and with huge and clumsy detail; though, in defence of these two buildings, it may be said that with their walls and vaults covered with painting, after the manner of the Spanish chapel at Santa Maria Novella, Florence, which was the original intention, the effect would be very glorious, the painting giving that scale

which the architectural detail



the cathedral at Seville differs most materially from that at Milan, and stands far above it as a specimen of mediæval art. Seville is a genuine piece of mediæval Pointed work. In the grouping and sections of its columns [fig. 93, A], in the way in which the arch moulds and vaulting ribs are carried down to the ground by the members of these vast clustered columns, in the method of vaulting and in the entire absence of iron ties, it is vastly superior to its Italian rival, where, as in so many Italian buildings, the whole place is strung together with iron. The vaults at Milan Cathedral are, in fact, domes with ribs on their faces; its columns [fig. 93, B] are quite cut off from and have no relation to the members above them, and the windows are in many cases half sham.

A study of later Pointed work in Spain shows that as time went on, and the French influence died out, the Spaniard grasped firmly the infinite and inexhaustible capabilities of the Pointed style. Big windows, suited only to Northern countries, gave place to great masses of thick wall pierced by small windows, letting in through their painted glass a wondrous transparent gloom, of which in the thick atmosphere of this island we can form no conception. Then, a great clerestory being no longer wanted, the aisles were carried up, gaining thereby a vast inclosed space, cool and refreshing in the hot climate. Large floor-spaces being required, the pillars were grouped and put far apart, and very lofty aisles naturally gave big bays and large spans. In fact, given the necessary conditions, the Spanish type, both of plan and section, seems the natural outcome. Street is compelled to admit some merit in the design of the cathedral at Salamanca, bad as the detail is; but in his most admirable book he, unfortunately, takes little notice of late Gothic buildings. He seems to have established a rule for himself similar to one I once heard the late William Burges, A.R.A., enunciate:—"There is no salvation out of the thirteenth century;" which seems a very narrow view of architecture. Surely, adaptation of buildings to the climate, to materials at hand, and to the requirements of the people, come before style or period, before mere details and sections of mouldings. Seville may not have thirteenth- or twelfth-century details, but it is a much more convenient church than Santiago de Compostella, and much more suited to the Spanish climate than Leon. Doubtless in the eye of the purist the detail at Seville is very damnable, though, being full a hundred years earlier than Salamanca, there may be some hope for it.

Having thus given a brief description of the main lines of design in Seville Cathedral, it becomes necessary to enter upon an account of the decay of the fabric even before the building was fully completed; to give reports upon the repair; to describe the fall of the central lantern or *Cimborio*, and its re-erection in a modified form; the effect of earthquakes, and ultimately the collapse of one of the great central piers, by reason of which the *Cimborio* once more fell, on 1st August 1888. It must be borne in mind that this church, like many of the later mediæval churches in Spain, has no external roofs covering the vaults or tops of the side walls. A rough section [fig. 92] I have prepared shows the outline of its construction. Settlements, and cracks consequent upon them, let the rain-water into the very heart of the walls

and vaults, and to prevent this it was recommended to cover the outside of the vaults with plaster, and to pave the wall tops with brick, *i.e.* large square floor tiles.

As has been already stated, the building of the new church was begun in 1403. It seems, so far as I have been able to ascertain by a somewhat hurried examination

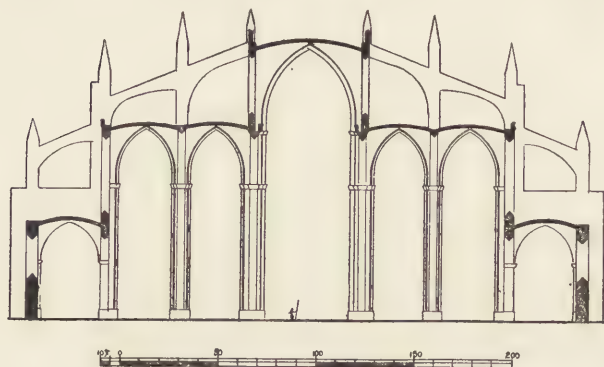


FIG. 92.—SKETCH-SECTION OF SEVILLE CATHEDRAL, FROM NORTH TO SOUTH.

of the fabric, to have been begun, as was customary, at the east end, but the detail of the work varies very slightly all through. The growth of the building is not so easy to trace, as it would almost certainly have been in an English building. Unfortunately there is no documentary evidence known which gives us the name of the architect who designed the cathedral. Cean-Bermudez\* suggests that it may have been

Alfonso Martinez, who, a few years before, was *Maestro Mayor* to the Chapter; or Pedro Garcia, who filled the same office in 1421.

Pushing forward the works in the interior, the façades of the west front and of the transepts were left rough. Here, as at St. Peter's at Rome, hurry to see something done has been the bane of the fabric. Cracks and settlements revealed themselves during the progress of the work. In the Biblioteca Colombina exists the copy of an important document in which the following statements are made. The document is dated 15th November 1508,† and is written by “*Joseph Tirado, Maestro Mayor de obras, y Lorenzo Fernandez de Iglesia, Maestro de obras de cantería.*”‡ The first describes himself as “master of the works,” and the second as “master of the works of masonry.” Here is a translation:—

Most illustrious Lord,—Joseph Tirado, chief master of the works, and Lorenzo Fernandez de Iglesia, master of the masonry, servants of your most illustrious lordship, (depose) that with your lordship's permission we considered the repairs which this holy church needs; and they are the following. First, that the walls of the nave and transepts which rest upon the main arches are of squared stones, and uncovered, and by them the water descends to the arches and vaults. And to avoid this damage, there must be put upon them a coating of mortar of hard stone lime mixed with mine sand (*arena de mina*), as the work had and has in parts, or the said walls must be floored with bricks of great magnitude. Also, one can floor with ordinary bricks, good lime, and sand, and little expense those parts where the water runs. And likewise as to the cracks which are in the said walls from the top to the bottom, they are to be tied with hewn stones at intervals to join and strengthen them, and prevent the water from coming down by them, which makes them of great detriment to the temple, and their joining must be closed together with splinters of slate, lime, and sand. Touching

\* J. A. Cean-Bermudez, *Noticias de los Arquitectos y Arquitectura de España*, vol. i. p. 84.—S. C.

† This document is printed in *Memoria sobre las causas del hundimiento acaecido el 1º de Agosto de 1888 en la catedral de Sevilla* (p. 5). So. Seville, 1888. By D. Adolfo Fernandez Casanova.—S. C.

‡ I cannot find these men mentioned in the *Noticias* of Cean-Bermudez.—S. C.



the cracks of the vaults—that they are in various vaults—namely, entering by the principal door, the second and third (vaults?) above the monument, are parted from above downwards at right angles to the vaulting ribs (*sus dobelas de quadrado*); the vaulting ribs are split from above downwards; that the remedy is to put in new ribs, taking away the broken. And there is another vault over the “coro” where the vaulting ribs are broken. That the remedy is to put in others, taking out these. Likewise, there are other two vaults in the aisle which adjoin the chapel of the Señor S. Joseph, and of the Señor Serbantes. These are weak at their joints, and need to be closed together with pieces of slate, good lime, and sand, and some others may be discovered (*por arriba*). Likewise the chapel of the staircase has an aperture which also is due to the stones, and this must be stopped, and the cracks of the stones bonded with slate, and also one must take away a great piece of mortar (probably filling in the pocket of a vault), which perhaps is earth, through which the water soaks, and so this, like the other, one must floor over again with lime and sand. Likewise must be made the three pinnacles which your lordship saw, which fall (threaten ruin?) upon the crossing and the Capilla Mayor, and which were ordered to be taken away because of the detriment which might result from their falling upon the aisles. This (*sic*) it is necessary to make again, because by their channels the water descends by the walls to the arches and vaults, and added to that, because of the unsightliness; and they stand upon the centre of the temple and Capilla Mayor, and for greater security to these said pinnacles their dowells must be made of marble instead of iron, that it may unite and not separate them. And each of the said pinnacles the stonemason undertakes for a price of 450 (*sic*) with all its mouldings and workmanship, that they may correspond to those which are opposite them. And that their height is more than four yards, and a yard square in the base; and he must be assisted in putting them up and lacing them. And, likewise, there are many other pinnacles which now are beginning to part, and which want the last stone and the last but one; these stones it is necessary to restore because the iron centre is laid bare, and the water descends by them; and by the crust which it forms, the iron parts the said pinnacles, and with it no repair will succeed. And there are other pinnacles, the stones of which are ready, and only need to be placed. And, likewise, there is a principal winding-stair: that this is parted, the central pillar from the steps, and this is very insecure; it is necessary to repair them. This, like all the rest referred to, must be repaired before any fall takes place and leads to great expense; since now it is calculated that it will cost up to 1,500 ducats, and in any vault which may come after (*suzeda*) it, will cost more. Likewise, the roofs (*azotteas*)\* and vaults must be plastered with great care, and some girdles (*cintas*) of brick must be put upon the vaults joined to and imbedded in the said walls, to keep out the rain-water. And for all these repairs which touch the quarrying—thirty cartloads of stone, with everything in proportion, will be necessary—the quarry-master undertakes to bring the cartload with speed, at his own cost, into the Puerta de las Campanas for 35 reals, such stone as cost for the sagrario 50 reals the cartload. And to repair the said vaults we have planned to make the scaffolding close to the vaults without its having piles, or anything which may be in the way or costly. And as to the lime of hard stone we have planned to seek suitable stone in the district of Jerena, in order that its bringing may cost little, because it must not be from Moron. And this is our opinion which we have made in legal form, according to our true knowledge; and we do subscribe it on November 15 of the year 1508.

How far these recommendations were carried out I am unable to say; there lay, however, a terrible catastrophe in store. This took place on 28th December 1511, and must be described in the words of Ortiz de Zúñiga in his *Anales de Sevilla*, Madrid, 1677.

The architect (*el Artifice*) who completed the work of our holy church had ventured to charge the four pillars at the crossing with a structure so lofty that it rose above the roof of the body of the church and nearly equal to the tower.† In this construction people did not fail to apprehend danger, the supports not being judged sufficient. This proved to be the case, for one pillar splitting, 28th December 1511, the Feast of the Innocents, after being sustained, as it were, miraculously all that day, it ended at eight o'clock that night by opening and falling down. It brought down with it all the lantern

\* The flat terrace roof of a house in Spain is called the “azotea.”—S. C.

† By this he means the Giralda, the great Moorish tower still standing by the north-east corner of the Cathedral.—S. C.

(*cimborio*) and three of the great arches, with a noise that stunned the whole city and filled it with grief and sadness, although as yet no one knew that it had been restrained from falling by a miracle of our Lady of the See, since without a marvel it was affirmed it could not have been sustained from the morning, when it began to split, until the night, when it came to the ground. The Chapter and the city immediately proposed its repair, and the citizens aided with copious alms, in which the King, Don Fernando, assisted. The archbishop having next day granted indulgences to as many as should assist to clear the church, there was such fervour that in twenty-four hours all the stone and rubbish was taken out. Meetings (*juntas*) of architects (*Artifices*) were held about restoring that work to the same size as before, but all deciding that to reconstruct it of equal altitude it would be necessary to build the four pillars upon which it must stand much more bulky, from which would result a great want of uniformity, whilst the choir and the *capilla* (i.e. the bay immediately before the high altar) would be incumbered, it was agreed to construct it as it now is without a high lantern; wherefore, neither has the floor space been made less, nor does any sign appear of the building having been different from what it is now.

I have not been able to find any pictures or representations of the *Cimborio*, the destruction of which is described in the foregoing extract. Its summit must have stood fully 100 ft. above the nave vault, and some 250 ft. from the ground. It was crowned with statues of the apostles, of prophets, and of saints, wrought by Pedro Millan, Miguel Florentin, and Jorge Fernandez Aleman.

Eight years were occupied in repairing the damage. The work was executed under Pedro Lopez, master of the works at Leon, Henrique de Egas de Toledo, and Juan se Alva de Villoria, who had built in 1498 the *Capilla mayor* in the cathedral church at Plaçencia. Juan Gil de Hontanon superintended the construction of the new *Cimborio*, which was finished in 1517, under Juan de Badajoz, architect to the Chapter of Leon. Instead, however, of rising some hundred feet or more above the great vaults, the new *Cimborio* stood up but 25 or 30 ft., the wall-spaces over the four great arches and below the wall ribs of the *Cimborio* vault being filled with pierced panels; and the whole work was most richly cusped and flowered. Though it has at last tumbled down like its predecessors, it is not fair to speak of it as entirely fallen. Its north and east arches are standing, and half the vault. Señor Casanova, the architect in charge, is of opinion that this half of the vault is quite secure. The appearance it presented in March 1889, looking up from below, was rather terrifying, as there was no centering nor any support beneath it.

We must not attribute the fall of its predecessor, the lofty *Cimborio*, entirely to overloading the piers on which it stood, or to their insufficient strength. There had been a serious earthquake on 5th April 1504. In 1511 there was another, less serious. A report of the greatest interest, and going into very full detail, is to be found in the Chapter documents, which is headed: "Opinion and report which Alonzo Rodriguez "the master made upon the damages (and remedy for them) which the structure of the "church received with the earthquake." This was, we must suppose, the earthquake of 1504, but internal evidence seems to show that the report was made after the fall of the lantern tower. He begins as follows:—

Most Reverend and very Magnificent Lord,—The openings and cracks in this, your holy church, are the following:

Beginning from the chapel of the Santillanes as far as the present sacristy, and going round



the circuit of the building. In the said chapel of the Santillanes \* is a crack which descends from the window to the ground; and this seems to proceed from the foundation, because it has twice been closed, and since it last was closed it has not cracked again, nor do I think it will do so. It is true that these cracks would be better closed in another way, wherever there is a cracked piece taking it out and putting in another.

Item, there are other two cracks. In the two cracks in the two walls of the transept, which are at the Red or painted Door; † and there is one in the one wall and one in the other. And these were made when those pillars on that door were made; because, as there are two very thick pillars with two spiral staircases, one on each side, and the walls were already old upon which part of this work rested, it was necessary that they should crack, not being able to sustain so great a weight; ‡ and the crack is between the windows. And on the side of the altar of Fernando Ramos, not only did the wall crack, but it even cracked through the chapel of Sant Francisco, which is in the middle of the window of the said chapel.

Item, this said chapel has another crack which comes through the very middle of the side window, and has cracked the arch of the window and goes up above the chapel; and through the haunches it goes cracking as far as the main arch of the transept, and thence as far as to crack the *taluz* of the window of the transept, and the *rosca* § of the arch of the window. And it has cracked a flying buttress, and a piece of the transept, and opened the main arch.

Item, the other two chapels together with this are cracked almost in this manner. The chapel of the Cataños and of Baptism are sound, with all the front of the door of Pardon with the other two side doors. Some of these cracks appear to me to proceed from the foundation because they come from above downwards, and others from the earthquakes.

Item, there is another crack in the aisle which commences from the chapel which has now fallen, || and comes as far as the door of Pardon. And this crack is very old, for as long as I remember the church of Seville I have seen it there. And this other which is on the other side, and like it, they made when the *escaçabes* of the nave were cut.

Item, on the other side of the chapel del Antigua, both the chapels of the Cardinal ¶ are cracked in the same manner as those of the other side. And in the wall of the transept from the one end and from the other are other two cracks, like those of the Red Door and similar. And in the chapel del Antigua is another crack, where was joined the new work with the old.

The remedy of all these openings and cracks. Most Reverend Lord, it is well to make a castle of timber, which must be made in such a way that it can be drawn through the whole church, as well along the aisles as athwart, going from chapel to chapel, taking out all the cracked stones and putting in sound, as well in the main arches as in the crossing, and in all the haunches and *enxarjamentos*, and walls and arches, and stone window-frames (*formerías de ventanas*).

Item, that for the remedy of the side chapels which the castle shall not be able to enter, they shall make hanging scaffoldings with which all can be repaired and bound together, and plastered that it may appear there has never been any crack there. So, all the cost of these repairs is the castle and the scaffoldings. And in this manner shall be mended all the other things up above, where there are some cracks of little importance.

Item, as to the nave, it has no cracks to speak of on the north side. Nor in the window above the cracked pillar which is by the organ is any impression made, nor any crack new or old; from which it appears that neither when it was strengthened, nor when the fall of the *cimborio* took place, nor with the cracks which now appear in it, has there been made the slightest change in the part above.

Item, some of the pinnacles are moved by the earthquake, and others cracked from the iron bars

\* Now called the Chapel of the Evangelists. † This is the door leading from the north transept to the Court of the Orange-trees. ‡ These pillars are doubtless the angle turrets flanking the transept end. § *Rosca* is "a screw."—S. C.

|| In a footnote to the above, a quotation from the Chapter archives is given as follows: "Wednesday, December 7, 1513: This day the said lords for as much as it was reported to them that the surveyors and other masters had removed certain parts of a chapel and had taken it down in order to rebuild it; and all at the cost of the fabric." The author adds: "If, as we believe, the opinion of Alonzo Rodriguez was written in 1511-1514, he might well speak of the chapel which has now fallen in reference to this which they took down to rebuild. We are still ignorant which it was."

¶ Now called the Chapels of San Hermenegildo and San José.—S. C.

which they have within them; and of these some have begun to be repaired, and all the cracked stones have been taken out of them, and the chinks filled up, and all have been strengthened, and are very well repaired; and some others remained for repair because no more could be done.

Item, in the aisle, on the south side, are some ribs and haunches cracked, and some windows of the nave. And this side has the pillars more sound, and the windows more cracked, and the side aisles more sound than those of the other side. The cause appears to be that the chapels receive on their roof more water, because it comes more fully upon them, and having more moisture they become more soaked and are made stronger; the wall of the nave with the windows gets more sun, because from the rising of the sun in summer until its going down it never ceases to visit them.

Item, there are in this holy church three kinds of pillars. Some are of 10 ft. (which is three yards and a third). These are two yards and a half square (which is  $7\frac{1}{2}$  ft.), so that this pillar would contain within itself  $7\frac{1}{2}$  times  $7\frac{1}{2}$ , which are  $56\frac{1}{4}$  (taking the foot to be one third of a yard), each one of these in width and in length.\* And these are the pillars of the side aisles. There are others which are 12 ft. from point to point, and have on the side 9 ft.; and these contain within themselves 9 times 9, which are 81 ft. And there are others which are and have 15 ft. from point to point (which is 5 yds.), which have on the side  $3\frac{1}{2}$  yds. (which are 11 ft.), and 11 times 11 are 121. So that the pillars upon which the dome rested contained within themselves 121 ft. of a third of a yard square, both in width and in length.

Item, the naves † of this holy church, from middle to middle: the greater nave, 60 ft., the transepts are the same; the side aisles, 40 ft.; the side chapels, 30 ft.; so that all this holy church is in width 280 ft. In length it has eight bays of 40 ft., and the transept and the side chapels 60 and 30, which would be altogether in length 410 ft.; and through the Chapel of the Kings and that of your lordship it is 430 ft. Now in these pillars, which are of 10 ft.,‡ there are four which hold the weight double of the others; and there are others of those of 12 ft., which hold and have held the simple weight, and are cracked like those of the nave and transept. All these abovesaid hold equal weight.

Item, that in that row of pillars which goes from the chapel of Baptism to the chapel of Sant Laureano are four pillars.§ The first of the chapel of Baptism is bad, which has some cracks. And the second, which is where the dean's chair stands in the main arch, upon which rest the walls of the nave, has nine courses of stones split, which are cracked as far as the first arch; from the nave it goes up four courses.

Item, the third pillar, which is where the *campanillas* (little bells) are, and the fourth, which is where the beam of timber now stands, are good.

Item, that in the second row (*horden*) of pillars, which are from the chapel of the Cataños to the chapel where the great altar now is, are four pillars. The first is filled up with brick, because I saw this when I strengthened it with certain stones, with which it is strengthened. The second, which is beside the archdeacon's chair, is the worst that is in the church; and the damage which this sustains is because it is all laid in lime and not fixed, because through this was put through the base a slender rod between the beds of the stones, two hand-breadths or more in the place where the wall of the *Remedios* || joined the wall of the choir. As it was there made strong, when the earthquake came, it met with most resistance there. In it are cracked thirteen courses of stones up above, and which go round a quarter of the pillar, so that it is all very broken.

Item, in the third row of pillars, ¶ which is where our Lady of the Remedios stands. These are all somewhat better, although they have some cracks which do not appear of so great importance.

Item, the fourth row, which are those of the Jesus de la Columna. Of these, the first pillar is one of those which hold the excessive weight; \*\* this is very sound. The second pillar, which is that of the organ platform; this is cracked, and the crack goes up through fully ten courses of stone penetrating about a quarter of the pillar. The other pillar of the platform is that which is least cracked, because the cracks do not penetrate beyond the outside mouldings, which is not much in comparison

\* The pillars are, approximately, square on plan; 10 ft. is the measurement on the diagonal of the square,  $7\frac{1}{2}$  ft. is the measurement on the side.

† The nave and aisles are all included under this term "naves."

‡ These are the pillars dividing the outer from the inner aisle.

§ He is now describing the rows of pillars across the church, beginning at the west end.

|| The Chapel Nuestra Señora de los Remedios.

¶ The screen closing in the west end of the choir stands in this row.

\*\* This means, no doubt, that the flying buttresses both of the nave and transept abut on it.—S. C.



with others. The other, which is further away, which is collateral, has some slight cracks in the base, which is little.

Item, in the fifth row, which is in the transept. The first pillar, which is in the chapel of Sant Francisco: this has some cracks, but they do not penetrate more than the first mouldings, and these have all been formed this past summer, because when I came from Arragon there was no crack whatever. The second pillar is the new one; \* to this there is nothing to say. The third pillar, which is the companion of the new one, has cracks *por una fendura (sic)* on its ten rows of stone; and in this height the cracks go in and out, breaking through divers parts, and this pillar has the most and greatest cracks in the place where it adjoined the walls.† The fourth pillar has some bruises and one crack in the *alzaba* at the top, which shows light through from one side to the other.

Item, in the sixth row of pillars, which are beyond (*i.e.*, east of) the transept, the first has some cracks as far as the first mouldings. The second pillar is very sound; the third and fourth without fault, and from thence forward all the others.

The method that must be taken to remedy these pillars, most Reverend Lord, in my opinion is, that we ought to know how many reasons they have to crack. I find there are six; wherefore, the causes known, the remedy can well be applied. The first, when in any work the pillars are built too slender; the second, they crack when the stone is badly hewn; the third, when the stone is badly laid; the fourth, because of the said pillar badly laid in mortar; the fifth, because of bad mortar; the sixth and last, because of the stone being soft and being laid contrary to the bed. For any of these reasons the pillars crack, although they are of the needful thickness and more. The pillar of the organ has three of these defects, it is badly laid, the mortar badly made, the stone soft; wherefore, without touching it, it looks like bran stuck together with white of egg. The other I have not tested to tell its defects, I know that the side pillars which stand in a line with these two bear each four flying buttresses, which are as much weight again as the others bear: which proves what I have said, that I see some bear the double weight and are good, and others bear the lesser weight and are broken.

The remedy, in my opinion, most Reverend Lord, according to the little I know of this art, speaking truly to your most Reverend Lordship, is the following:—

It is our opinion that stones ought to be brought from the quarries, a yard and a half long and two courses in height, which are three *palmos de vara*, and one yard across the base, and if it was desired to give them half a foot more it could easily be done. And with such stones the pillars will be well strengthened and it will be a good work in my opinion, and as good as that of the new pillar that now is made. True, that to arrange them in the mouldings it suits better to have those of a yard (3 ft.) in the base. So the pillar which is 15 ft. from point to point has three yards and a half on the square, so that taking out two yards, one on each side, there remains a yard and a half of a centre.‡ And the pillars of 12 ft. from point to point have three yards on the square; taking out one yard on either side, there remains one yard of core. And those of 10 ft., three yards and a third from point to point, have two yards and a half on the square, and somewhat more; taking out two yards, one on either side, there remains to them a little over half a yard. So that my opinion is, that if these stones are well laid and fixed, and are well bedded in mortar, they alone, without the core, would be able to sustain the burden which the said pillars have to bear and more; and this I would hold better work than that which at present is made of the "new pillar," if in this manner a new pillar should be made. For this we have an example in the fortress which is at Carmona. The stones being high and large, it is built without any mortar; being such soft stone as it is, it is a marvel that they hold one upon another. And, as your Lordship knows very well, that the larger and thicker the stone is, the more it preserves its integrity. Wherefore, I judge that the edifice will be more lasting, as I have already said, being made with this lime which we now use.

Now, I say, most Reverend Lord, that if any of these side pillars should be damaged or should be about to fall, the nave, even though it had the walls underneath, would not hold up—nor would the transept; because, as these side pillars hold each four flying buttresses (two from the nave and two from the transept), the nave and the said transept have only three feet of wall, and three of *fenesci*, and four of pillar, which are in all 10 ft., and are not sufficient to hold the nave nor the said

\* That is, the north-west pillar of the crossing, which had previously fallen. † This is the south-west pillar, which has recently fallen. ‡ Stones a yard deep on the bed were to be put in. A core of a yard and a half in the centre of the pillar would be left.—S. C.

transept—the nave being of such height and 48 ft. in breadth of span, so that in no manner could it sustain itself,\* so that the walls beneath would not serve until the pillars should be mended; because, if any one whatever of those which are on the one side of the Antigua or on the other, which is at the chapel of Sant Francisco, should fall, the nave could in no way sustain itself; because the nave is 48 ft. in span, and being, as it is, 120 ft. in height, it could nowise sustain itself. And if perchance any one pillar of the four † should fall, as it recently fell, forasmuch as the span between pillar and pillar ‡ is only 28 ft. and the pillar is in thickness 12, it would be sufficient to hold all that remained as they now hold it. And if perchance any one of the pillars which are at the end of these walls should be about to fall, the wall would avail it nothing, being built against it and not bonded in; because, as one has to make for these walls new foundations which are twenty-five rows of stones in depth and eighty rows in height, it could not be bonded without breaking (I omit speaking of the deformity to a temple so famous as this).

Most Reverend Lord, about this strengthening of these pillars, much could be said; but my opinion is, that where damage appears in them, as well to see and know all the damage and injury in them, as to apply the proper remedy, one ought to act with them as surgeons do with wounds, *i.e.*, cicatrising them to see the damage done and the cure needful. And this one may do with the pillars, beginning by taking out the cracked stones and putting in sound ones; because, doing this, one shall remedy the damage which is apparent, and it will be seen if there is more damage concealed which likewise may be remedied.

Item, I say that if we should find any cracked stone between two sound ones, these two sound stones are weak, and appear only to be sound. I say that it would be much better to take out such than to leave them in the work, because, being of the same nature as the other cracked stones, it is to be believed that, if left, it (*sic*) will crack like the other; and it would afterwards be more inconvenient to return to take it out from thence and disturb the pillar, than to do it now; because to do it now, is to do it once and not twice.

Item, likewise some stones (there are) which are sound, and have the mortar weak and crushed to powder. To this, I say, that it is better to take them out than to leave them; because, as is said above, it is one of the principal causes of the cracking and perishing of works, especially in pillars.

Item, if there should be another stone placed and it was *badante*, which is to have in front, one finger breadth of mortar and within three, I say that it is better to take out such a stone and not leave it in the work, if the mortar of such a stone is not found as strong as the stone itself; but if it should be weak, this single stone would itself crack, and also the other which it has upon it.

Item, if perchance there should be any stone which was one half broken and the other half sound: to such I say that it would be better to take it all out than not to take out the sound half; because, taking out the half and leaving the other half there, three rows of stones would come together; because, this stone is of such a nature that until it cracks it is the best in the world, and after it has cracked it all crumbles like bran.

If perchance any pillar should be found, which had a filling up of half bricks and quarters like that which fell. This, it appears to me, that one ought not to omit to remedy; for the good doctor cures what the others give up. This we ought to set to work to remedy. And in order that your Lordship may give credit to this, that it can be done, you shall know that it is very well known in Bologna that a tower was removed from one place to another, entire as it stood; and the needle of Rome is greater than any of the side pillars, and it was placed upon three great waggons of metal more than a thousand years ago. And many other great works could be cited in example, if it were necessary to be proved. Many things appear to men difficult which, if the instruments and appliances were seen with which they are done and executed, would appear a small matter to do. In Seville, if one had to launch a *carraca* on the river, or to take it out of the river and place it on the land, it would seem an impossibility, and in Genoa they hold that nothing.

Item, as to the mortars, most Reverend Lord, that have been used in this holy church hitherto, I say that to one bushel of lime one is accustomed to put a basket of sand, on account of the weakness of the lime. And as to the mortar which is now made, they put two baskets of sand to one bushel of

\* I cannot explain this passage, unless it means that the clerestory walls above the arcade are too thin to stand the thrust of the nave vault, if the flying buttresses should fall. † At the crossing. ‡ He means the clear span of the nave arcades.—S. C.



lime, because it is stone lime. And as to the lime which hitherto has been made, it is a lime which is made of an earth called *tosca*—a hard earth, and yet not so hard but that it can be dug with a mattock. And it is of such quality that in itself it holds much moisture, because wherever it is it always has above it much sand, and when it is made lime and used in places which have much moisture, being in that which is its natural element, as in ponds and fountains, or in water-mills, and such like places, it stands very well; but if they put it in places where there is dryness, and it does not get a share of moisture, it is converted into dust and not lime.

As to this matter, most Reverend Lord, I find that the best master of work is lime when it is good, and it appears to me that I ought to state the condition and why it is put into buildings. The soul of the building is the moisture; as of the human body the radical moisture, so of the stone. With fire they draw out the moisture, and make lime of it. To return to be stone as it was before, it takes the water with the sand, and keeps and preserves it until its return to what it was originally; because, as says the philosopher, all things seek to return to their original state. And if they have more moisture, the sooner do they become stone and the stronger. As says the philosopher, about making the walls of Rome, how they should be made that they might last for ever; he said by making of the earth stone, and of the stone earth. There is an example in the tower of your holy church; the lime and the brick is good to last a thousand years, and the marbles are already broken.

Most Reverend Lord, it appears to me that one ought to conclude with the chapel of the Kings—may they have a sacred glory! This chapel is in breadth 55 ft., and in length 50 ft. (*pies*). This chapel is shaped octagonal, and in the angles are two sacristies on the outside. Inside it is to have in the straight wall, close to the pillars on the one side of the gospel, a niche in which may be the effigies of the kings, which are made of sculpture with their tomb, and this niche is to be of very rich workmanship and is to go up as far as the entablature. And for this one must seek very good stone, because that now used at the church is no use for that work. On the other side adjoining is an altar accompanied with good work, in order that that piece of wall may not remain bare. In the other three walls that remain there is to be a rich *retablo* of wood, gilt, and in the middle Our Lady of the Kings with her tabernacle, which she now has. And in this manner this chapel is to rise to the height of the side aisles.

Item, this chapel is to be three steps above the ground, and is to begin from the plinth outside the pillars, and to rise to where the *rexa* is to be placed. From the level of the second plinth is to begin the pavement of the chapel.

Item, the greater altar of this chapel is to be raised one step, and the platform of the altar and the altar behind is not to have any step. The niche where the effigies of the Kings are to come is to have four courses of stone, and from these four courses is to arise the niche—rich as befits such a chapel.

This niche and altar rise, as is said, as far as the first entablature, and from thence upwards where at present the wall is burst anew; a work of masonry somewhat thicker, that it may have more strength and may go up as far as beneath the vaulting ribs.

Item, this chapel may be attached with very good art as the master saw, attaching it to the abutments of the side aisles, as has been said. And above one may raise its pillars and attach its flying buttresses to the aisle, where they now are marked as to be attached, and may raise its pinnacles in keeping with the rest of the work, putting their *alpiradores* and crowns round about.

Most Reverend Lord, that which is said and written above is what, before God and my conscience, appears to me necessary to be done in this holy church.

ALONZO RODRIGUEZ.

The foregoing is followed by a commentary, also between inverted commas, of which a translation is here given:—

The interesting information which we have just transcribed gives a good account of the damages which, at the very time of the completion of its fabric, appeared in the monument; and damages increased by the haste with which its work was finished. We possess many dates which prove it so, and in the books of the acts of the Chapter are very frequently mentioned gratuities given by the Chapter to the master and officers, because they were working with speed.

The subsequent history of the church proves that the undue haste with which it was built, the indifferent stone with which many parts were constructed, and the occasional earthquakes, gave rise to constant anxiety and repairs.

The new *Cimborio* had four heavy corner turrets; these were removed to lighten the burden on the great pillars. It was even proposed not to groin the *Capilla mayor* with stone, but to roof it with wood.

November 30, 1514.—We, the Archbishop and Dean and the Chapter of the holy church of Seville, being called before day by our verger, to discuss and determine how the *Capilla mayor* of the crossing of this holy church is to be closed in by reason of the great difficulty and danger that in it until now has (been) had, coming to votes by word of mouth determine for the following reasons that which is written beneath. Considering the report which we have had of many edifices which have been made of vaults of stone in this archbishopric, and other cities of these kingdoms and abroad, of the which the greater part have fallen down, and many others are in danger of falling. Likewise, having, as we have very present to us the fall of the *Cimborio* of the holy church, and looking at and considering the greatness of the said chapel, which exceeds in quantity 80 ft., and considering the pillars upon which one has to build to be, as they are, weak, and the stone very soft sandstone and limestone, and that the masters who many times and from divers parts have come to give their advice as to this have scarcely had any difference of opinion, and others have judged that not to leave a risk the said chapel would have to be made of stone, like the foundations upon which one had to build as for the quality of the stone of which it had to be made. Likewise, having consent and counsel as well of learned masters of the art (*del oficio*) as of many other expert persons, and who in many parts of the world have seen similar things, it is agreed (*conviene asaber*) that it would be a thing very secure and sumptuous and seemly to finish the said chapel with wood and carpenter's work. We all most unanimously agree, determine and command that the said greater chapel of the said transept of this holy church be finished with wood and carpenter's work, with its mouldings and ornamentation, and be made as sumptuous and beautiful as may be. And to carry out this and summon the best masters that can be had, by whose counsel and work it may be done, and likewise to provide wood and other materials and things necessary for the said work, we depute, appoint, and charge our beloved brethren, Don Diego de Cortegana (archdeacon of our said holy church), and Don Jeronimo Pinellos (master of the school of the same), and Don Pedro de Fuentes (archdeacon of Niebla), and Luis Fernandez de Soria (canons of our said holy church), to whom we give power to provide all that may be necessary for the said building.

This decree of the Chapter was made in the city of Seville within the archiepiscopal palace, November 30, 1514.

The roof over the *Capilla mayor*, i.e. over the high altar, was, however, constructed in stone, as may be seen to this day.

In 1755 there was a sharp shock of earthquake, which is thus described \* :—

On Saturday, November 1, 1755, exactly at ten in the morning, there was felt in our Patriarchal Temple an earthquake so terrible that, not only did it exceed anything in the recollection of the natives, but of those who had experienced the earthquake of the year 1680, October 9.

The matter threatened truly to be an image of that described to us by the prophets, which is to happen at the Day of Judgment, and all the people of this great city cried out that the day had come, especially those who were in our holy church. The day began with wrath, but ended with pity, by the prayers of our sovereign empress.

At the hour before mentioned they began to perceive, gently, a perceptible noise from the east, which increased gradually until the oscillation of the church produced confusion and horror. They were singing the *kiries* of the mass, with the full harmony of the voices, organs, and instruments as

\* *Motivos que fomentaron la ira de Dios, en el terremoto de 1º de Noviembre de 1755.* Por el Dr. F. J. de Olazaval y Olayzola. 4o. Seville (no date).—S. C.



usual. Instantly all sounds were hushed, and then in their place rose dismal cries of *Misericordia*, *Piedad*, *Confesion*! Some collapsed in a fit, benumbed; other fell, either overtaken with fear or because the ground failed them with its violent movements. Many rushed out of the church, trampling on each other in the doorways in search of some place of refuge, a cause of death to some few.

In the church was so terrible a noise that it resembled the report of cannon, caused by the toppling over upon the vaults of the crossing of the balustrades of stone which adorned the exterior and the four lofty pinnacles. Others fell upon the vaults of the aisles; a cause beyond doubt of the circumstance that the inside of the church was filled with a dense cloud, various fragments of stone falling upon the pavement with some of the bands of flowered decoration which adorned the interior of the crossing. No greater damage happened than that which has been stated.

The above description is very graphic. The bombarding of the huge vaults by falling pinnacles gives a peculiar horror to the scene.

From the foregoing it will be seen that the fabric of the cathedral has suffered in two ways. One, from the use of stone too soft, and this in an irregular way, so that one pillar or piece of wall will now be found good and sound, whilst an adjoining part is full of cracks and settlements; the other from earthquakes. Sturdy as the great pillars are, it is not without wonder that we see the building in as good a state as it is. There can be no doubt that had the pillars been properly constructed, not only would there have been no occasion for apprehension, but that the original central tower would have stood. Very hard stone is to be had in plenty, and piers of solid ashlar will carry a stupendous weight.

The pillars carrying the *Cimborio* are described as being 15 ft. from point to point, 11 ft. on the side of the square, 121 sq. ft. The Spanish foot used by Rodriguez in giving these dimensions is a little less than the English foot, but the sectional area is full 100 sq. ft. English measurement [fig. 93, A]. The pillars rise fully 60 ft., and then receive on two sides the arches opening into the aisles. These arches show that the walls they carry are of a good thickness. There is no triforium, only a stone gallery below the clerestory window, and on a line with the spring of the great vaults, about 100 ft. from the floor. It will thus be seen, although the pillars are lofty, they are very large, and the construction above, instead of being full of openings, arches, and possibilities of movement and cross-thrust, as, for example, at Amiens, Reims, or Cologne, is solid and stable. Instead of the great thrust being, as it usually is in a Northern Gothic building, about half way up the pillars at the crossing, it is near the top, where it is met by the great arches of the centre tower.

At Milan (a somewhat parallel construction), the pillars at the crossing are the same as those all over the church, which are contained in a circle of 7 ft. 10 in. in diameter [fig. 93, B]. The width of the nave at Milan is, from centre to centre, about 62 ft.

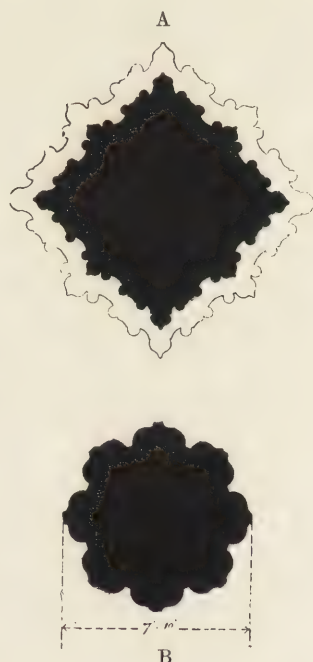


FIG. 93. — SKETCH-PLANS OF  
PILLARS AT SEVILLE (A) AND  
MILAN (B) CATHEDRALS.

English ; it is wider, therefore, than Seville, which, as already stated, is 55 ft. centre to centre. The pillars are, however, nearer together, the bays at Milan being about 31 ft. centre to centre, as against 36 ft. 4 in. at Seville.

The pillars are about the same height in each church, viz. about 70 ft. If, therefore, Milan stands up, much more should Seville, as the sectional area of the pillars is much greater. As already said, the pillars at the crossing at Milan are only of the same sectional area as their neighbours. To the roofs, where the lantern begins, is just about 150 ft., and the lantern rises solid for about 60 ft. or more, a total of 210 ft., with very large pinnacles above. What the *Cimborio* at Seville was like we do not know. It was surmounted by four great corner pinnacles, so that, probably, the body of it may not much have exceeded in height the lantern at Milan.

The pillars at Milan are constructed of marble. Of their internal construction I have no knowledge, but, apart from the weight of the structure above the level of the roofs, these pillars must bear a load immensely greater than those at Seville. Señor Casanova, who at the time of my visit to Seville was the architect in charge, and showed me the works in progress, pointed out that, in many of the great pillars carrying the nave vault, the interior was not much better than earth, whilst the external stone facing was of poor and non-resisting material.

We know how in our own country, from imperfect construction, the centre towers of Winchester, Lincoln, Ely, and Chichester have fallen, whilst Peterborough was only preserved by entire rebuilding. In Spain, too, the tower at Burgos fell ; and that at Zaragoza had to be taken down, about 1505, and rebuilt. No doubt more could be added to the list.

I first saw Seville Cathedral in 1878, when the interior stood free of all scaffolds, and at first sight it seemed the picture of august solidity. In 1882 Señor Casanova reported upon the state of the *Cimborio*. On 10th November 1883 he made another report, consequent upon the earthquake of the preceding October. He shows that the condition of the crossing was most critical, and the cracks and settlements increasing, whilst many pillars and arches were found to be in danger. Señor Casanova concludes this report to the Government by stating, "That the fabric has suffered from terrible "cracks and dislocations, and that if much time and money be not immediately "expended, the life which remains in this renowned artistic gem will go out."\* On 26th December 1884 came another earthquake, and urgent attention was called to the terribly precarious state of the building. In what year work was begun I do not know—I think in 1887. There are numerous entries in the archives, showing the constant state of apprehension in which the Chapter found themselves, and the repairs which were from time to time carried out.

To relieve the weight on the great piers of the crossing, the vault was taken off the south transept. The bay of the north transept immediately adjoining the crossing was also relieved of its vault, which was afterwards rebuilt with great care. The

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\* See Señor Casanova's *Memoria*, the title of which is given in a footnote on page 178 *ante*.



weakest pillars were supported by big vertical barks of timber, acting as a sort of jacket, which were in their turn shored with struts.



FIG. 94.—VIEW, LOOKING NORTH-WESTWARD.  
(From a photograph taken immediately after the accident.)

So far as I may venture an opinion, the system of support in all directions seemed excellent. The support was chiefly concentrated upon those parts of the

B B



building towards the east end of the nave and the south transept where the greatest danger was apprehended. When the supports were considered sufficient, the risky work of the entire removal and reconstruction of one of the pillars was undertaken, and successfully accomplished. The new pillar was not the south-west pillar of the *Cimborio* or crossing, but the one next it southward, in the south transept, and which carried part of the clerestory above. It was the pillar described by Rodriguez in his report (already quoted), as having a crack you could see through. The vault had been already removed. Most carefully constructed centres were placed in the arches and under the vaulting ribs. So little was it apprehended that the great south-west pillar of the *Cimborio* would yield, that the magnificent stalls in the *Coro*, which come up to this pillar, were not removed, the great iron screen or *Réja* which shuts in the *Coro* was left standing, and the south organ, with its overwhelmingly elaborate case towering above the stalls, was not taken away.

On the 1st August 1888, this great pillar came down with a crash, bringing with it the two arches carrying the south and west walls of the *Cimborio*, and opening respectively into the nave and south transept. One arch of the nave arcade, one of the transept, and all the vaulting adjoining, fell with it. The arch of the nave arcade fell on the top of the south organ, smashing it and some of the stalls beneath. The huge timbers of the centres and struts went like matches. Half the *Cimborio* vault fell, the break following the line of the diagonal rib from north-west to south-east.

The figs. 94 and 95, taken by a photographer in Seville immediately after the *Cimborio* fell, show the fearful nature of the catastrophe. The point of view from which the fig. 94 is taken is in the south transept, looking north-westward into the easternmost bay of the *Coro*. The front of the organ, on the north of the *Coro*, is seen on the right of the spectator; the upper part of the south-west pillar of the *Cimborio* is seen lying inclined on the heap of rubbish formed by the lower part of the same pillar. The spring of the cross arch lies in one huge piece, scarcely separated from the pillar on which it formerly stood. The sheets of corrugated iron with which the transept was covered in when the vaults were removed, are lying on the top of the broken stones in all directions. Fig. 95 is taken from the scaffold in the north transept; the spectator looks south-west, and sees the remains of the south organ and of the gallery on which it stands. He is at a height of about 70 feet from the floor, and nearly level with the springing of the nave arcade. The great pillar immediately on the right is that at the north-west corner of the *Cimborio*, and is that which was reconstructed after the fall in 1511.

The way in which the great pier broke seems to indicate that in its reconstruction, after the fall of 1511, the same recklessness was shown as seems to have been so common in the Middle Ages. The pillar which fell in 1511 was at the north-west corner of the *Cimborio*; it brought with it the arch across the nave and a part of the pillar opposite at the south-west corner. The north-west pillar may have been rebuilt from the ground—at any rate, it has withstood the recent shock. The south-west pillar, the one that has now fallen, does not seem to have been rebuilt from the



ground. A great piece of it was foolishly left and the new work was built on it. The new work was very good, as was proved by the fall ; for it came down in enormous



FIG. 95. — VIEW FROM THE SCAFFOLD IN THE NORTH TRANSEPT. (From a photograph.)



masses, holding firmly together. The old masonry crumbled under it, the new piece coming down end first and driving a most terrific hole through the marble pavement into the earth just at the foot, but a little east of the place it had formerly stood up in.

I venture to think it very probable that the removal and reconstruction of the adjoining pillar on the south had, in fact, given the finishing touch to the south-west pillar of the *Cimborio*. The moment the middle—the old—part of this pier began to yield and crush under new movements and strains from the adjoining arch, the new work of 1511 slipped forward more or less in one piece and let down everything near it. Señor Casanova seemed to have taken great precautions. I was, however, surprised to see that no system of iron ties clasping the arches at their spring had been adopted. I remember that when the centre tower and spire at Chichester fell, one of the first precautions taken with the remaining work was to tie back the adjoining nave and triforium arches with a combination of timber and iron. These ties were carried back through several bays, and strong raking struts were also erected against the direction in which the arches would naturally have spread.

Notwithstanding the tremendous mass of masonry which fell, the amount of damage done to the furniture and decorative objects in the church has been but slight. The gilt metal *Réja* or screen shutting in the *Coro* was bent and knocked about, but by no means past recovery. The choir stalls suffered on the south side, at their eastern end. These stalls are a very stately range of fifteenth-century work, and some were hopelessly smashed. The immense rococo organ-case above them is demolished, and is not a great loss. The sumptuous marble-work beneath it and facing the aisle is not much damaged, one arch only being broken down out of three.

This truly glorious church has hitherto been saved from the ravages of restoration. Instead of being a frigid galvanised corpse, the walls neatly scraped white, and joints pointed with black mortar, its history effaced and interest more than half gone, it remains a building of the most majestic proportions and pleasant colour, with its pictures, screens, tombs, and ornaments. I venture to hope that the sad accident which has befallen it, and the precarious state it is in, will compel the public money which is being spent on it to go in the direction of absolute conservation and repair, and will not permit the demon of restoration, who has already set his hoof upon Cordova and other places, to work his devilish arts in the Cathedral of Seville.

The fig. 96 shows the very magnificent substructure backing the choir stalls, and carrying the front of the great organ towards the aisle. Up to the level of the cornice over the arches, this work is composed of rich red marble, with gilt bronze caps and bases. Above these the strange rococo panels are of plaster or white stone,—I cannot say which. The wrought-iron balcony fencing in the organ gallery shows itself. The organ-cases, in dark wood, are of the same overloaded style as the rococo panels.

When I visited the church, a very few months after the catastrophe, the whole building from end to end was being cross-shored. A mighty timber tower was set up around the site of the fallen pier, and the foundations for the new one were just level with the pavement.



The Giralda has, unfortunately, been "restored." It is a huge brick tower, some 45 ft. square and 200 ft. high, of Moorish work, crowned by a very picturesque



FIG. 96.—SUBSTRUCTURE CARRYING THE ORGAN. (From a photograph taken in the aisle.)

Renaissance top. The bricks, which were in parts perished on the exterior, have been cut out and new ones inserted; but, in addition to this, parts of the wall-



surface seem to have been refaced with plaster, neatly scored with deep joints and coloured. It must be remembered that in Andalusia plaster will stand out of doors very well, and in a very short time the imposition would be difficult to detect, especially far from the ground. The whole of the interior of the wide inclined passage by which the tower is ascended is entirely modern, and brickwork is imitated by deeply scored plaster, painted pink.

I fear that my account has been more historical and less technical than I could have wished, but I am not aware that any description, similar to that admirable account of the fall of Chichester spire \* by Professor Willis, exists of the accident at Seville. It is probable that a careful study of the cathedral in the latter city, such as he gave of that of Chichester, would show where the work was rebuilt after 1511, and how far the late catastrophe was consequent on the old.

SOMERS CLARKE.

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\* \* The Discussion [see verbatim report in *The R.I.B.A. Journal*, Vol. VII., pp. 198-199] was carried on by Mr. William White, F.S.A., Mr. R. Herbert Carpenter, F.S.A., and the President, a brief abstract of whose remarks is here appended:—

MR. WILLIAM WHITE, F.S.A., *Fellow*, referring to Mr. Clarke's remarks upon the *Coro* and Westminster Abbey, objected to the present arrangement of the Abbey, as it entirely altered the whole of the interior grandeur, and gave it, to a great extent, the appearance of an elongated nave and chancel, without, as such ought to do, terminating in some central object—the altar, for instance. He thought the disturbing balance of pressure (consequent upon the removal of the vaulting) would not have had so serious an effect upon the pillars at Seville had the bedding of the materials been entirely through them, instead of vertical casing with softer filling-in.

MR. R. H. CARPENTER, F.S.A., *Fellow*, agreed with Mr. Clarke that Mr. Street put the date when the Spanish arrangement of the *Coro* began too late, and was of opinion that it was as far back as the fourteenth century. He had seen examples of the square east end in the north—at the Church of St. Nicholas, Burgos, for instance. At Salamanca new Cathedral the square east end had been probably so planned through the influence of Seville Cathedral, for the Master of the Works there, Alfonso Rodriguez, had been one of the two architects who prepared the conditions and main dimensions on which the cathedral had been designed. Photographs showed how the fall at Chichester resembled that at Seville, while the material inside the piers was utter rubbish.

THE PRESIDENT said there were several churches in the north of Spain with circular or apsidal east ends, arising, no doubt, from French influence, and the Cathedral of Granada showed that Spanish architects, though preferring the square east end, could on occasions do very well without it. The work at Seville undertaken in 1511 was certainly of a superior character to the original masonry, for a piece of the pier which fell down acted like a battering-ram upon the floor, and remained intact notwithstanding its fall. He considered the catastrophe at Seville differed from that of Chichester in that the latter pier had a good skin and a uniformly defective interior, while the pier at Seville was defective in its lower portion, with a thoroughly good upper portion, the work of the restoration in 1511.

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\* See TRANSACTIONS, 1860-61, pp. 231-250, for the late Professor Willis's Paper on "The Architectural History of Chichester Cathedral, and on the Fall of the Spire;" and pp. 251-265 for a Paper, by the late George R. Burnell, on "The Operations lately carried on at Bayeux and Chichester Cathedrals."



LXXXII.

SOME ASPECTS OF SCULPTURE CONSIDERED  
IN RELATION TO ARCHITECTURE. By Mr. GEORGE SIMONDS.

Mr. Alfred Waterhouse, R.A., *President*, in the Chair.

MR. PRESIDENT AND GENTLEMEN,—

THE subject before us seems to demand a general consideration of the arts as at present existing, of their past history and modern practice, and of the relations in which they now stand to one another. Let us then consider what art is, and how it originated and developed; thus we may probably discover what should be the true relation of each branch to the others, and especially what should be the proper relation of sculpture to architecture. We are, however, at once met with a remarkable fact, namely, that there are, or are popularly supposed to be, three arts, not one art. Yet, if we try to define what we mean by art, we should hardly be satisfied by saying that it consisted of painting, sculpture, and architecture.

A satisfactory definition of art is not very easy to find; but perhaps we might not go far wrong if we were to say, that art is embodied poetry, and poetry disembodied art. The same aspirations are common to both, and both strive to the same end, the elevation of humanity and the idealisation of our lives and surroundings; both fight unceasingly against the meanness, squalor, and ugliness of life, and both uphold the great truth, that what is beautiful is good, and what is good is beautiful and true; that truth and beauty are eternal, and shams and ugliness are unenduring; that life is worth living if we live it worthily, and that the world is overflowing with evidence of the eternal beauty and goodness of its Creator.

Oh fools, and if ye did but know  
To what a heaven this earth might grow,  
If Fear beneath the earth were laid,  
If Hope failed not nor love decayed.

So sings Mr. Morris in *The Earthly Paradise*; and truly it seems to me, that if the ideal

state so graphically depicted in these few words is ever to be realised, it must be in a great measure through the teaching of poetry and of art. Not of art as we now see it, classified and subdivided, ticketed and docketed, and placed in museums; valued by the rich, chiefly as a means of display and ostentation, by the learned as a peg whereon to hang a treatise or a discussion, by the frivolous as affording topics of after-dinner small-talk, and by the trader and speculator as a remunerative investment. Art under these circumstances can do little, and her influence for good is sadly restricted. Yet the days have been when art was loved and fostered for truer and better reasons than now, not by the few, who in some way or other find it to their interest, but by entire nations. Is it too much to hope that what has been in the past may recur at some future time?

Whilst strongly maintaining the unity of art, I do not attempt to deny that its usual division into three branches has its advantages for purposes of classification, and of conversation. Yet surely it is carrying matters a little too far, if we habitually ignore their close relationship, or, still worse, force them into competition and enmity with one another.

We have, however, reached this point, and the public—and I am sorry to say many artists—speak and act as if art began and ended with picture-painting; whilst I have heard it gravely discussed whether architecture was to be considered as an art or a profession. It seems extraordinary that such a question should ever be raised; and yet, perhaps, after all, it is not wonderful when we consider that each of the arts is now isolated from the others, and that architect, painter, and sculptor are carrying on the struggle, each on his own account; each shouting and blowing his trumpet, striving to win the popular attention for his own art, were it but for an hour. If instead of all these noisy solos they could be induced to play together in harmony, how lovely the concert might be!

Art is the resultant of the creative and poetic instincts common to humanity, and is always to be found as soon as man is able to secure a little respite from the struggle for bare existence. Then the savage carves ornaments on his war clubs, scratches figures on the walls of his cave, and even practises the arts of the painter-etcher on his own dusky hide. Probably painting is the oldest art, for doubtless the savage painted himself for war before he found time to ornament his weapons and utensils, or turned his attention to improving his cave-dwelling, or to superseding it by hut or wigwam. Painting and sculpture were merely pastime, for the gratification of a vague desire for beautiful form and colour, as then understood; but man was driven to the invention of architecture by his physical needs, and when once the idea of building was grasped, it needs little imagination to see how eagerly it would be followed up. Painting and sculpture were purely ornamental arts, and architecture a purely useful art.

It must have been long before architecture could emerge from the purely utilitarian, and take her rank as a fine art. Yet, even amongst the dwellers in tents, we find that architecture aspired to more than the strictly necessary, and that these



frail and portable dwellings were not only carefully studied in form and construction, but even adorned with coloured designs either of painting or embroidery.

The development of tent architecture, however interesting, can hardly be considered part of our subject to-night; for although we learn from the Bible that the nomadic races had sculpture, as when Rachel stole Laban's idols, it is evident that these were used merely as furniture, and had no relation to the architecture of the tent. In the construction of the Jewish tabernacle, that most complicated piece of tent architecture, it is certain that both sculpture and embroidery were used for the decoration both of the building itself and of its furniture, for we read of "two cherubim of gold, of beaten work," "in the two ends of the mercy-seat," and of these the description is very complete. There was also the veil of the tabernacle "of blue, and purple, and scarlet, and fine twined linen of cunning work" "with cherubim;" also sockets of silver for the boards of the tabernacle, and taches of brass for looping the curtains. There were also pillars of shittim wood overlaid with gold with brass sockets; not to mention the famous branch-candlestick with "his knops" and "his branches."

When flocks and herds ceased to be the primary consideration, and land became property *par excellence*, men required permanent abodes, and architecture rose to the rank of a fine art. Without agriculture, architecture, in its fullest sense, could not have existed. When men till the ground, sow and reap their crops, and again cultivate the same soil for future harvests, they no longer care to dwell in tents, but require permanent and more commodious dwellings. When the earth yields her increase in unstinted measure, and men receive more of her bounty than will suffice for present want, they must perforce enlarge their borders, and construct barns and granaries to store the golden harvest.

As wealth accumulates, leisure increases; and inasmuch as wealth, before the invention of bank accounts and paper money, could hardly have been desired for its own sake, but rather for the enjoyment and dignity it brought to its owner, the only way to employ both wealth and leisure was by increasing the comforts of material existence, enlarging the retinue of servants, increasing the household accommodation, and finally by beautifying and adorning the house itself.

It seems to me that, in a primitive agricultural community, architecture should flourish in exact ratio to wealth; but in a trading community choked with the commercial atmosphere of modern times, when men amass fortunes, existing in a great measure only on paper and in bank accounts, and are as pleased with reading the figures as with holding the cash; when the world is so full of greed and speculation that vast capitals of shadowy millions are lightly created by the stroke of a pen and as lightly lost; I hardly see how there can be room left in men's hearts for any better art than that they usually get, nor, indeed, how they could appreciate the noblest architecture even if they should happen to see it.

The laws of economy, those terrible trammels to art, certainly teach the correct system of construction. Houses, granaries, barns, and stables must all be made in

accordance with their requirements; and yet if we may do no more, if we may not go beyond and add something to these requirements, we can hardly claim that our architecture is more than a science, and assuredly we cannot rank it as a fine art. It is only when architecture ceases to count the cost, and is enabled to expend more than mere construction requires, that she is enabled to take her true position and to press colour and form into her service.

This of course can be done to some extent without the aid of either painter or sculptor. But when architecture desires to go beyond the broad and simple effects that can be produced by the judicious choice and use of materials, whereby, indeed, beautiful work may be produced, she is forced to call in the other arts. Colour is applied by the painter, and form wrought out by the carver or modeller.

What, then, is the relation in which the arts stand to one another when thus combined? Common sense will settle this question. As a certain modern poet says,

Quiet calm deliberation disentangles every knot.

Architecture is the employer; that is to say, she wants certain things done, and asks the other arts to do them for her. Clearly, then, they must do for her what she requires, or their assistance will be no help at all, but the reverse. Architecture must be mistress of the situation. She must know her own mind, say what she wants, and as the advertisements say, "see that she gets it." Unfortunately it sometimes happens that she is as much in doubt about her wants as a lady in a bonnet shop, and in such cases often gets what does not suit her.

What ought she to want that her own resources cannot give her? Nothing save ornament—applied ornament—and thus this great question is brought into a nutshell. A tough nut I know, and not too easy to crack, yet the principles are the same whether it be a question of adorning a teaspoon, a cathedral, or a private house.

Thus far, then, we have got: sculpture in relation to architecture is to be considered as applied ornament.

This, although the general rule, is by no means without exception, for there is another relationship, which occurs when sculpture is the dominant idea, and architecture is called in to provide a base, or a setting; as in the case of monuments, where the statue is the centre of interest, and the pedestal is of secondary consideration; or of shrines, where the figure of a saint is the object of devotion, and the architecture merely provides a worthy setting.

Of cabinet art I need not speak since it is obvious that, whether it be painting or sculpture, it usually bears no relation to any architectural design whatever; it is merely portable property, or furniture.

The laws of ornament as applied to architecture, or indeed to anything else, are not unlike those of good society; easier to understand or even to practise than to explain, and hardly to be acquired by the study of a handbook. There is another point of resemblance: they are largely founded on principles of judicious self-restraint, and they chiefly begin with "*Don't*," or at least contain a prohibition.

The first and most important rule is that the ornament shall in no way interfere



with the proper functions of the object ornamented, nor conceal its purpose. Thus a pap spoon is meant to feed a baby, but if some one presents our offspring with a spoon, the bowl of which is curiously wrought into wondrously embossed and impossible flowers, we find that the nurse, though she will no doubt pronounce it lovely, will, nevertheless, always use an ordinary spoon, because it has a smooth bowl, which is comfortable to the mouth and is easily cleaned. Thus flowers embossed on the bowl of a feeding-spoon are misapplied ornament, for at least two good reasons—which, however, might not apply to spoons for other purposes.

Another rule, too often forgotten, is that the ornament employed should not be disproportionate in value to that which it is destined to adorn. Better leave your niches and friezes blank than fill them with decoration of disproportionate value. Worthless and trumpery carving on a noble building is like cheap Brummagem jewellery on a duchess; nor is it much better to see diamond earrings on a scullerymaid.

One more maxim I should like to enforce is, that we should not leave unadorned any parts of a building that fairly admit of decoration. I do not mean by this that we should sacrifice all repose, and let the sculptor and painter loose on every blank space that could conceivably be painted or carved; but rather that no space should be left blank unless there were a gain in so leaving it. This would very frequently be the case. Indeed, it seems to me that, in our modern dwellings, it is hardly possible to insist too strongly on the artistic value of plain surface. How many houses do we not know that have had large sums of money spent on their adornment with disastrous results, because quantity, rather than quality, was aimed at.

It is fair to say that in mistakes of this kind the fault does not usually lie with the architect, but with his client, who too often wants to get twice as much as he, in reason, ought to expect for his money; and who, moreover, frequently does not know whether the work be good art or the reverse, and often wants that which is utterly wrong from the artist's point of view.

Next arises the important question as to which parts of a building should be adorned with sculpture, and which should be left plain or decorated by other means.

It would be hard, indeed, to lay down a rule of universal application, yet we may perhaps assume that carving is usually admissible in positions where there is ample light (so arranged, I may here remark, as to produce sufficient shadow—a thing not always found), and where the situation affords some degree of protection from injury, as in pediments or spandrels. Such spaces afford advantageous fields for sculpture which is seen to great advantage, being, as it were, framed or enshrined, and thereby also protected from chance injury. These positions, therefore, should be occupied by choice work, not by common mason's carvings.

Again, in wide spaces of blank wall where sunk panels are used, sculpture may often be turned to excellent account; though such spaces, if within doors, would in all probability be equally well adorned with painting.

The shafts of columns I cannot consider as being usually good fields for sculptural decoration. When seen near at hand they are not objectionable, and, therefore, we

can pardon the use of them in certain positions—as, for instance, in Sansovino's tombs [figs. 97–100]\* in Santa Maria del Popolo at Rome, or in the Palazzo della Signoria at Florence [fig. 101], where you are always near enough to see the design fairly well; whereas out of doors at a short distance the ornament becomes unrecognisable, and serves only to distort the firm, strong outlines of the shaft, or even to give it a weak and wavering appearance, as if crinkling up under the weight of the superstructure.

It is, I think, for the same reason that very elaborate bases and capitals are seldom quite satisfactory; even the Corinthian seem to have reached the extreme verge of good taste. Caryatides, when used as independent supports, seem still more objectionable, and always give me a sense of great discomfort even when employed by such masters as the ancient Greeks. When, however, caryatides are used as applied ornament, that is to say, when there is a visible and adequate architectural support for the superincumbent weight, and the sculpture has little or no actual work to perform, the effect may be extremely fine. Especially I like them when, as was frequently the case in Egyptian works, they are not detached figures, but form part and parcel of the stone pillar, so that one feels them to belong to the architecture, and not to be mere accessories, pretending to support that which has no need of their assistance.

The proper amount of relief to be given to work in any particular position is, indeed, a point of the very first importance and difficulty; so also is the amount of realism which is admissible. The successful use of caryatides, and, indeed, of much other sculptural decoration of architecture, depends almost entirely on these two points, and in every case the conditions will vary, so that it is impossible to lay down hard and fast rules, but the decision must be left to the good taste and good sense of architect and sculptor. Consider, for instance, the decoration of a pediment, a feature that lends itself to sculptural decoration in an eminent degree; indeed, from its very nature and form, it seems to cry aloud for decoration of some sort. It is a common practice to fill in such spaces with grand sculptural compositions, with figures either entirely detached or in very high relief. This is not always suitable; and in London we have, in one street, two good examples illustrating the principle of how to do and how not to do it. I allude to Buckingham Palace Road. I never pass the Royal Mews without stopping to admire the powerful group of Hercules and the Mares in the pediment of the stables. The relief is exactly suited to the position and to the point of view, namely, the opposite side of the way; nor can I ever see this work without a silent hope that if ever I had a similar problem to deal with I might be equally reticent and equally successful. We cannot but experience some revulsion of feeling when, but a few hundred yards further on, the eye catches a sumptuous building under the guardianship of St. George, which also has its pediment; and, as is only right, the effigy of the Saint occupies a very prominent position, but, unfortunately, the post of honour is usurped by the belly of his horse, which, from the very high relief, assumes undue importance.

\* These are reductions on zinc of Plates 130–133 in F. M. Tosi's *Raccolta di monumenti sacri e sepolcrali scolpiti in Roma nei secoli xv e xvi*. Fo. Rome, 1856–60.



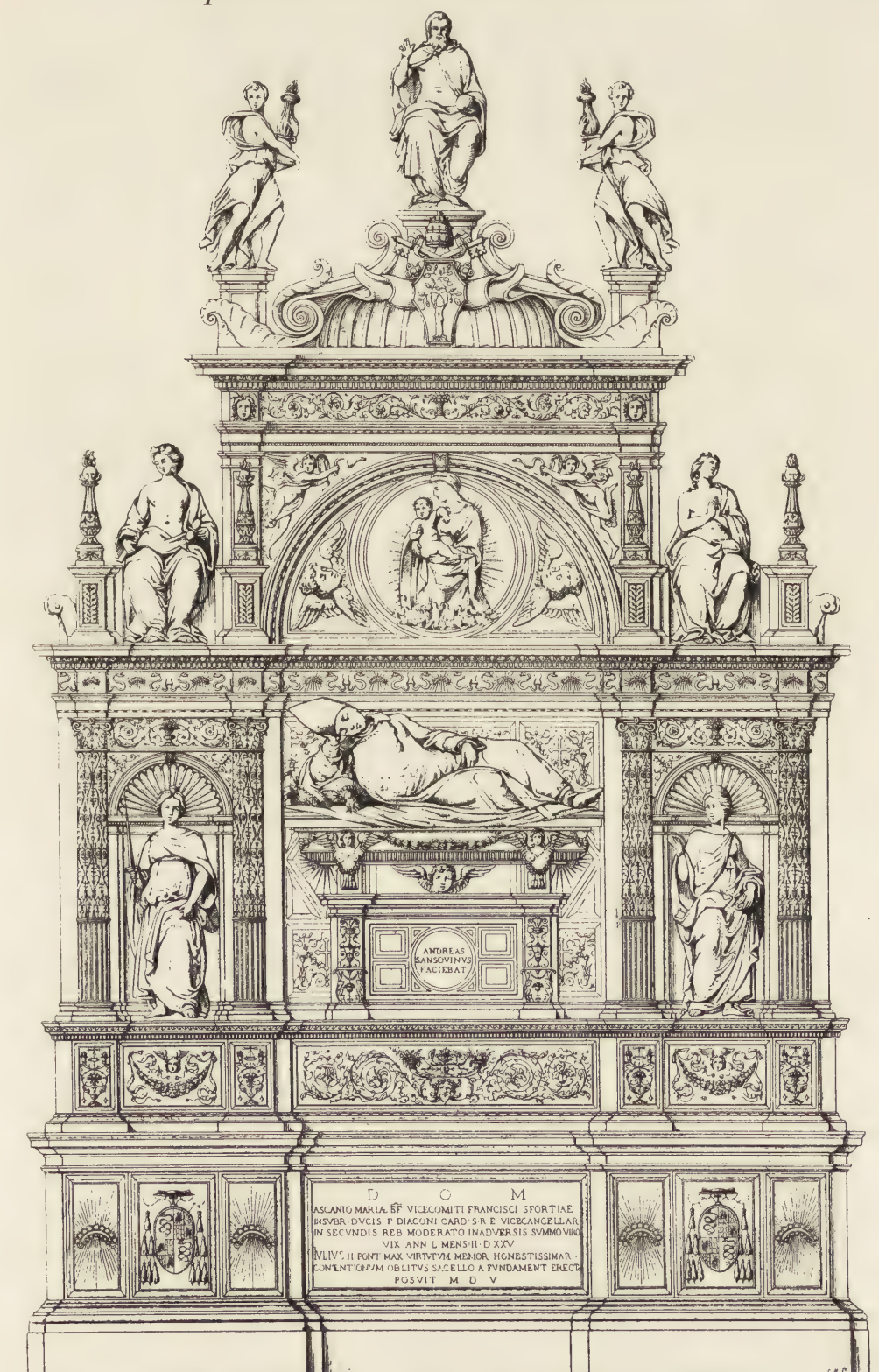


FIG. 97.—SEPULCHRAL MONUMENT OF CARDINAL ASCANTIO SFORZA [see figs. 98, 99, 100].





FIG. 98.—DETAILS OF THE SFORZA MONUMENT [see figs. 97, 99, 100].



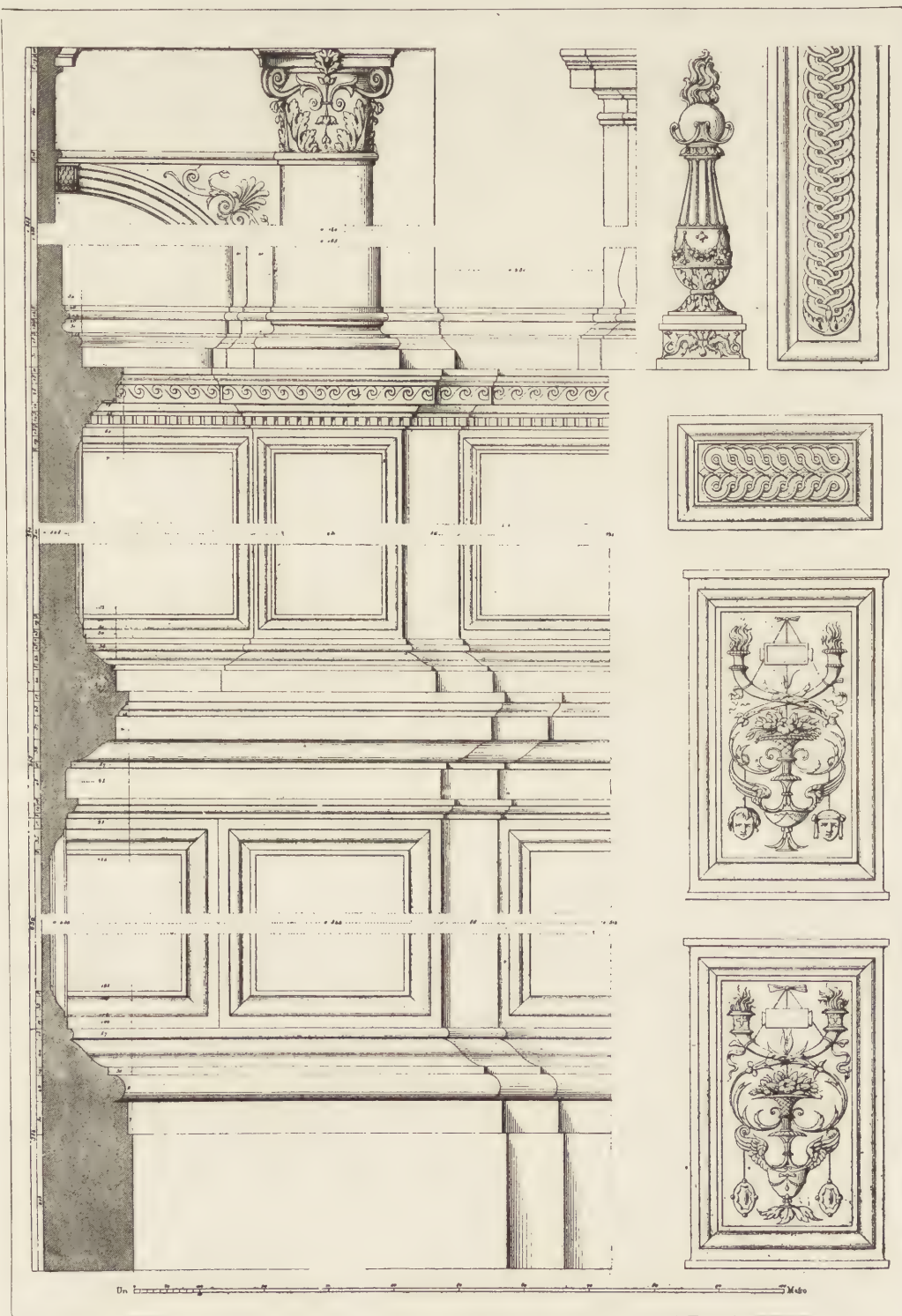


FIG. 99.—DETAILS OF THE SFORZA MONUMENT [see figs. 97, 98, 100].

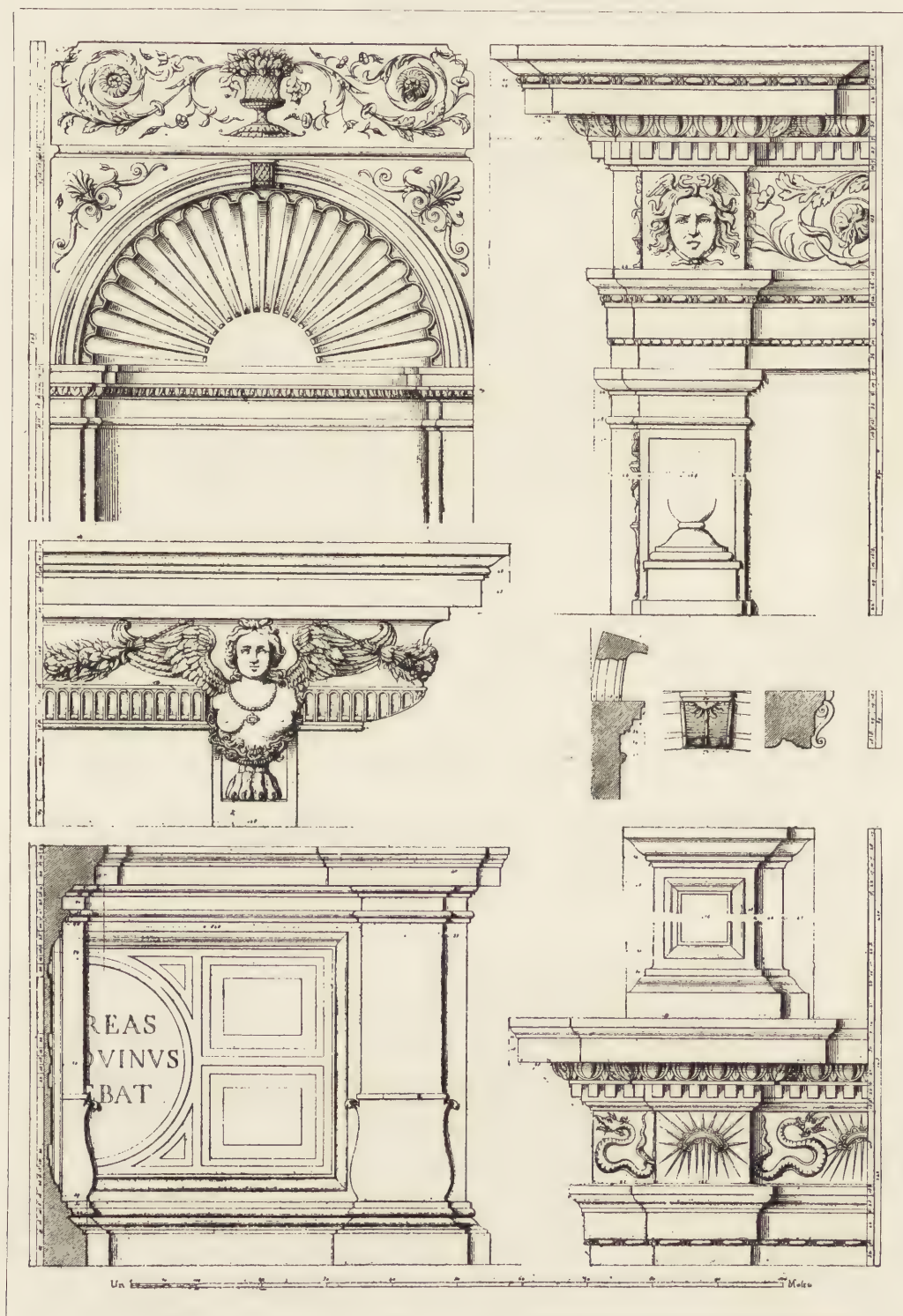


FIG. 100.—DETAILS OF THE SFORZA MONUMENT [see figs. 97, 98, 99].



The point of view is the same as in the former example, namely, the other side of the road, but the height from the ground is greater; nevertheless the artist has made his relief considerably higher, with the result that the foreshortening is most injurious to its effect. This was a case for great restraint and a stern repression of ambition; but one is not always wise, and it is easier to point out faults in others than to avoid them ourselves. In any case, it is better to try, and fail, than not to have tried at all; and the failure is only partial, the effect being much better than if the space were left blank,—though it suffers severely by comparison with its powerful rival at the other end of the road.

Much has been written and said to prove that marble sculpture is out of place on a stone building; and, if we are to conceive of marble as seen when first erected, no doubt the objectors have some reason on their side. But no work of art worthy of the name is seen at its best when freshly turned out. Indeed, age is an excellent test: if it does not improve under the touch of time, something must be wrong, and radically wrong; for it is astounding how time harmonises stone, marble, and all other materials, and forms an agreeable whole out of what at first seemed mere incongruous patchwork.

This reflection is particularly valuable to the sculptor, whose works are of all the most enduring. I never bring a statue to completion without the thought that some day it will be an antique, broken, shattered, defaced, perhaps existing only in fragments; and then comes the recollection of the glorious fragments that have come down to us from the great masters of olden time, and I feel that we should not leave our works without having done our best to make each part,—hand, foot, head, or arm,—worth preserving, even though all the rest were lost.

Truly, time and its effect on our work deserve consideration. If any one has an hour to spare in Liverpool while waiting for train or steam-packet, he may easily employ it by looking at the public buildings in that city. He will, no doubt, find much to criticise, but something also to admire, and from which he may learn. Certainly, he must be hard to please if he does not admire the effect of the marble statues on the Town Hall. They are not, perhaps, in themselves remarkable works of art; but time has had its effect on them, and has given them a tone that exactly suits the building, and the contrast of material, which may at first have been inharmonious, has now become altogether pleasing.

Should it be pleaded that life is short, and that we cannot afford to wait for the tardy hand of old Time, I would propose a stroll to St. George's Hall. There we may see sculpture in and out of every possible relation to architecture, quite enough to furnish subject-matter for an excellent Paper, without any need to look further for illustration. For my present purpose, it will suffice to notice that, on one side of the Hall, there are two bas-reliefs sunk in the wall, part of a series of panels, of which, as yet, only these two have been erected. I saw these for the first time about three years ago, shortly after they had been placed in position. The designs were pleasing, but the general effect was crude; and I was not so much surprised as sorry to hear

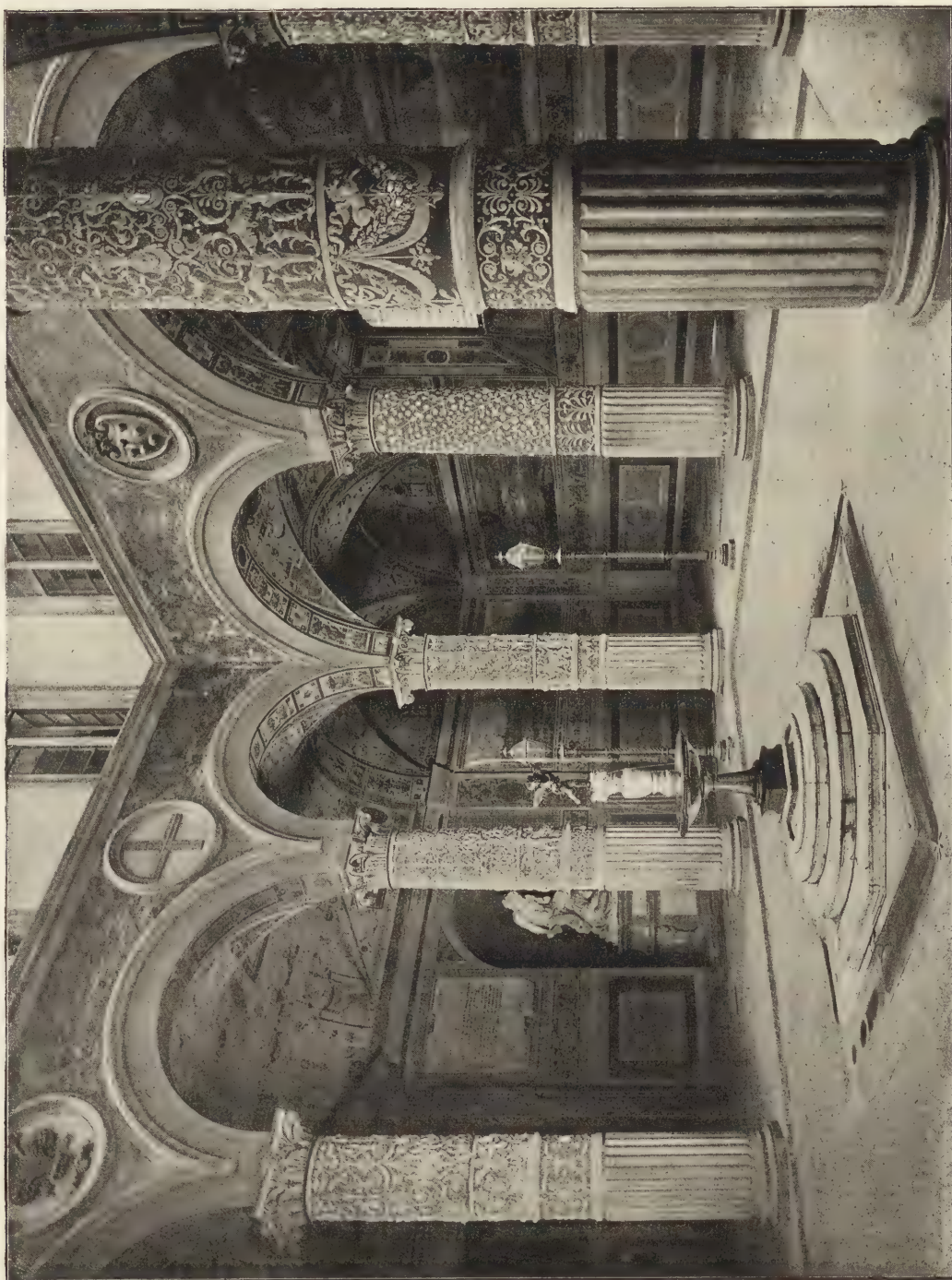


FIG. 101.—COURTYARD IN THE PALAZZO DELLA SIGNORIA, FLORENCE. [See p. 200 *ante*.] (From a photograph.)



that the authorities of Liverpool had decided not to go on with the work. Since then, however—a public-spirited gentleman having loudly protested against the work being stopped—they have permitted him to have it finished at his own private expense. I do not think any one, I am happy to say, will regret this permission; for I saw these same panels only a few months ago, and already the crude white had vanished: instead of discord there was harmony.

Perhaps it may not be an altogether useless digression from our subject if I here say a word or two about marble. People often have an idea, a very wrong one, that marble for sculptural purposes is of two kinds only, "Statuary" and "Sicilian," or, as I often hear it still more erroneously expressed, "Carrara marble" and "Sicilian marble." Now, be it known to all whom it may concern, that "Sicilian marble" is only a trade name, known only in England, for a marble that comes from Carrara, and from no other part of the world; and that "Statuary marble" is not exclusively brought from Carrara. In fact the best, most reliable, and the most durable statuary marble is the output of the "Mont' Altissimo" quarry at Serravezza, and was almost unknown in England until about fifteen years ago. This marble is as strong, and resists the weather as well, as the so-called "Sicilian," but is not easily obtained in such large blocks. Being a statuary marble, the blocks are not trimmed to regular shapes, as is the case with "Sicilian," or "Marmo ordinario," as it is called at Carrara; nevertheless, I have had a block of 157 cubic feet from Mont' Altissimo, which was, in fact, the first large block that came to this country. Its price—two pounds per cube foot at the quarries—makes it rather costly for many purposes. Most of it goes to France.

The ill repute into which statuary marble fell, for outdoor work in this country, was mainly due to the large importations from the Bettolia quarry. This marble was favoured by dealers because its price at the quarries was very low compared with other statuary, and the English sculptors of the past generation, with rare exceptions, knew very little about marble, and seldom used the chisel themselves; so that they were entirely in the hands of their Italian carvers. These found it to their interest to recommend this marble, which is very easy to work, brilliantly white, almost like sugar in appearance, and not much harder; it is very free from blemish, and can be obtained in blocks of vast size. When freshly quarried it stands well under the chisel, finishes beautifully, and is strong enough for any work that is to be kept under cover. After lying on the marble wharf for many months it becomes rotten; I once had to work up a block so far gone that it was only by rubbing garlic on it that I could get it to stand the chisel, for it would only crumble instead of leaving a clean cut. It is used in Italy for all the cheap sculpture that is so largely exported, but is never expected to stand out of doors.

Of far better quality and strength is the "Crestola," from a quarry but a short distance from the former. It is found only in blocks of medium size, and it is rare to get a block over fifty cubic feet. It is close-grained and very transparent, which

is, indeed, the only drawback to the use of this beautiful marble, as it is sometimes difficult to get sufficient depth of shadow. In very deep undercutting, as, for instance, in the folds of drapery, the shadows are never really dark, but of a translucent, greenish tone, like the under side of a big wave.

"Polvaccio" and "La Mossa," two quarries lying near together, are usually confounded under the name of "Pianella" from their situation. These marbles are of very fine quality, close-grained and rather opaque, warmish in tint. Blocks of large size are taken out and command high prices. As little or no blasting is done in these two quarries, where, indeed, it would be highly dangerous, the blocks are unusually free from vents; but they are unfortunately subject to small black spots, technically termed "moschini" or fly marks. These constitute a great objection to the use of this otherwise almost perfect marble.

The so-called "Sicilian" comes from the Ravaccione Valley, and from the Canal Bianco, in the Carrara Mountains. There are many quarries of it, but only a few that turn out stuff fit for sculpture; most of it goes to the saw mills. "Cava Gioja" is the best.

The statuary marbles from the Monte Rombolo district, as well as those of Piedmont and the Tyrol, are hardly ever exported, though I have had opportunities of seeing blocks of each worked in Italy. They are in character somewhat like the Greek, but are free from the hard, flint-like layers that are so objectionable in the Pentelic.

It is, as already said, difficult to make definite rules as to where sculpture should, or should not, be employed, yet one position there surely is where no sculpture should ever be, and that is on the floor.

Although common sense, our greatest guide and safeguard in art as in all other sublunary matters, would condemn the practice, yet it is certain that sculptured floors are not unknown in the history of art, as witness the flooring from the Palace at Kuyunjik, built by Sardanapalus III. about 700 B.C., and which is known to us all from the Assyrian collection in the British Museum. It is a most lovely design, chiefly composed of the lotus flower and bud, which form the centre and the outer border. The principal inner border is derived from the honeysuckle, and there are two minor borders composed of a daisy-like blossom. Pity it is that so lovely a work should ever have been trodden under-foot, even in a palace; yet we must remember that the hobnailed boot, of what we are pleased to call our Western civilisation, had not yet been invented; nor did educated people then, as now, carry all the dirt and filth of the public streets into their houses with them.

Nothing, to my mind, so stamps our Western nations with barbarism as this little fact, that we wear our dirty boots in the house. It is wrong in every way; it is dirty, it is unsanitary, and most inartistic, for it utterly prevents anything like a proper ornamentation of our floors. Take an ordinary parquet flooring—surely a modest enough decoration for that part of the room which is always beneath our



eyes, whence there is no escape, and which, therefore, surely ought to be made interesting,—how does it look after a year's wear, and what labour does it not entail to keep it in anything like decent order? What would the floor of the Palace at Kuyunjik look like after a few months' wear, under the boots, I will not say of the common herd—they would hardly get admission to the Palace—but of the highest society of modern Europe. Imagination boggles at it. Perhaps you think that I need not have cited this example, as it hardly applies to our times or to our country, as no one is likely to lay down so delicate and perishable a pavement as that of Sardanapalus. But, if I am not mistaken, we have laid down sculpture on our floors, at least in our churches, and the practice still obtains. It always goes to my heart to see finely carved gravestones worn past recognition on the floor of some church, or to find brasses, once richly engraved, of which little remains save a mere silhouette, with here and there a few indications that beautiful and elaborate design once existed.

I know that some folks have a theory that these things are more suggestively beautiful now than they were when fresh from the hand of the master; but I cannot admit that plea. To suggest beauty is not to solve the problem of art. The beauty must be made manifest. If we go on the lines of suggestion, naught but slipshod work will be the result. Nor were the great masters of antiquity content with suggestion; they revealed beauty to us. Look at the Elgin marbles—look at the frieze from the mausoleum at Halicarnassus: they do not hint at or suggest possibilities to us, but they show us, fully expressed, the highest beauty we are capable of conceiving, and that in all probability human nature itself is capable of conceiving, in all its splendour. Much, no doubt, may be suggested in a sketch; but in a finished work of sculpture it is expression, not suggestion, that is required. I am not quite sure that this belongs to my subject; but I wish to enter my protest against what is often falsely termed “imaginative art.” This is almost always a misnomer, being a misapplication of words and a gross perversion of their sense. Imaginative art is art full of the imagination of the artist, not the vague, unfinished art, if art it be, that leaves everything to the imagination of the spectator.

Sculptural decoration, as we have seen, is at times applied to floors, and a floor is, in my opinion, a very proper place for decoration; but not sculptural. I cannot bring myself to say, with George Herbert,

My friend may spit upon my curious floor.

I would much rather he did not, whether it were sculptured or inlaid, though even if he refrained, and went barefooted, there is still the objection that the carved surface would not be comfortable to his feet, nor easily swept and cleansed. In fact, I do not know a better example of sculptural decoration misapplied, than the beautiful floor of the Palace at Kuyunjik.

From the floor it is but a short flight to the ceiling, and here, no doubt, there is a clear field for sculpture; and I am happy to notice that, within the last few years, considerable attention has once more been given to this class of decoration.

I remember with great pleasure an evening spent in this room, only a short while since, when the subject of the decoration [p. 69 *ante*] of ceilings was very thoroughly gone into and some excellent Papers were read. The subject of ceiling decoration is a most fascinating one, and might afford matter for at least a dozen lectures of an hour each, if the subject were properly treated, subdivided, and illustrated. At present I can only say, what I have said before, that in my opinion the greatest reticence should be observed in ceiling decoration. There can be no greater mistake than crowding your decoration in any position, but nowhere is it more fatal than on a ceiling. The old Romans well understood this, or at least the Græco-Roman artists did, as witness the tombs on the Via Latina [figs. 102, 103], and the ruins discovered near the Farnesina, some ten years ago [figs. 104, 105; and 20, p. 73 *ante*].

It must have been on some such antique decoration that Adam founded his style of ceiling; and though, since his day, we have made many most elaborate designs, often covering the entire space with a profusion of ornament, and often, alas! repeating one foolish pattern *ad nauseam*, yet I do not think that we have produced much improvement in this respect, and personally I greatly prefer a good Adam ceiling to most of those that have since been produced with such profusion of ornament.

Inasmuch as the object of a ceiling is, primarily, to cover in the room, and, secondarily, to diffuse and reflect the light admitted through the windows below, it seems obvious that we ought to keep it clearly defined, as the upper boundary of our room, and also light in colour if we desire it to act as a reflector. I can conceive of no worse decoration for a ceiling than pictures. Take, for example, the Villa Rospigliosi. The Aurora is no doubt a beautiful picture in its way, but it destroys the ceiling, and would be better seen on a wall. Such works may be so grand and so beautiful that they destroy the architecture altogether, and then the room must be said to exist only for the support of the painting on the ceiling; but in either case, although the ceilings may be covered with the highest art, it is unwise so to cover them, if they are to be considered as decoration. If not so intended, then why, in the name of common sense, place them in the worst possible position for being seen?

Do not suppose for one moment that these remarks of mine are intended as any slight on what I regard as the greatest works of pictorial art ever produced: the paintings of the Sistine Chapel. Many a time have I lain on my back on the floor, when my neck has ached too much to maintain any longer the erect position, and gladly would I do so again, to study those glorious works; but Michelangelo himself disliked the task, and only undertook it by the express order of the Pope, his most imperious, not to say tyrannical, master. He did not decorate the Sistine Chapel, he created a new building, using the old one merely as a foundation for entirely new architecture, rich with sculpture and painting, the whole executed with the brush.

I suppose that no Paper on sculpture in connection with architecture can be considered at all complete without some mention of the works of India and of Central America. Of these, however, I am unable to say anything except from hearsay; but from what I have been able to gather of Indian architecture and sculptural decoration,





FIG. 102.—PART OF CEILING AND WALL DECORATION, LOW RELIEF IN STUCCO.  
In a Tomb on the Via Latina, Rome.



they seem to me to be so far removed in style from ours, that we can hardly hope to deduce from them much that would be of service to us in this country, or applicable



FIG. 103.—CEILING DECORATION, LOW RELIEF IN STUCCO.  
From the Painted Tombs on the Via Latina, Rome. (From a photograph.)

to our architecture. If I may judge from the few representations I have seen of ruins in Yucatan, the ancient dwellers in Central America treated their sculptural decoration



in a manner which, in any case, we cannot but appreciate and approve. Their temples seem to have been placed on the summit of vast pyramids; they were



FIG. 104.—STUCCO BAS-RELIEF FOUND NEAR THE VILLA FARNESINA, ROME. [See fig. 20, p. 73 ante.] (From a photograph.)

rectangular in plan, long, narrow, and low, as to their walls. They were covered with high-pitched roofs of great height; the roof above the cornice being higher in

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proportion than the vertical walls below. The front wall of the temple was pierced with five doorways, open from floor to cornice, leaving wide and massive piers between each. The width of doorway and pier was apparently nearly equal. Each pier was adorned with a colossal figure rather low in relief. The effect, as far as I can judge from description and illustration, is almost classic in its grandeur and simplicity; and the sculptural decoration has certainly been applied with great skill and judgment.

The Egyptians were great employers of sculpture in their architectural works; but although their use of it was at times purely decorative, as, for instance, in the avenues of sphinxes guarding the approach to a temple, yet this was by no means its sole use. On the contrary, both sculpture and painting seem to have been chiefly called upon for purposes of record by these people.

Their interior walls were often entirely covered with pictures, either in relief or otherwise, and with hieroglyphic inscriptions. These were not always placed there with a view to decorating the walls, but often the walls themselves seem to have existed chiefly to support and protect these historical records. The Egyptians, however, were far too good artists to allow the general effect to be other than harmonious and decorative. The same remarks, I think, will be found to apply to the Assyrians, those great masters in sculptural art, who so completely identified their sculpture with storiage that they did not hesitate to cover their carved figures with cuneiform inscription, whenever it suited them to do so. This is hardly what we, nowadays, should call decoration.

Our use of sculpture at present is somewhat different. We have lost our appreciation of it as historical record, and thereby we have deprived it of half its value. The only building in England, I might almost say in Europe, that shows an affinity to the Assyrian or Egyptian temple in the historical aspect of its sculpture, and in the extent to which its walls have been utilised as a record of national history, is Westminster Abbey; and, hideous and strange and incongruous as many of the sculptures there may be, they produce as a whole that wonderful effect which, taken with its glorious architecture, makes Westminster one of the most impressive churches in Christendom. And though I agree that the greatest care ought to be taken not to erect any new monument there which will not be a credit to our age and to our national temple, yet I earnestly hope that no man will ever be permitted to remove a single stone from that grand and continuous sculptured record. I should even protest loudly against turning out Chantrey's crowning outrage, the statue of Watt.

After all, what could give us a better type and picture of that date than the colossal statue of Watt placed in that position in Westminster Abbey? Further comment is needless,—but do not touch it,—it is history; and by throwing down columns and removing monuments one does not alter facts, but writes oneself down an ass, or a Vandal. If we put up any sculpture and do not like it, we have a perfect right to pull it down; but we have no right to destroy the art of our forefathers. There is no style of art which we may consider bad or foolish that was not at one time or other thought to be the only true style, nor any art so good that at some time or other





FIG. 105.—STUCCO BAS-RELIEF FOUND NEAR THE VILLA FARNESINA, ROME. [See figs. 104 and 20, p. 73 *ante*.] (From a photograph.)



it has not been condemned: witness the Elgin marbles. Of one thing we may be sure: some day or other the art we are now producing, in all sincerity of faith that we are doing the right and the only thing, will be condemned and slighted. It is possible that day is not far distant, but I would fain hope that though for a time our descendants may condemn and scoff at our works, at least they will neither remove nor destroy them.

The same principles that governed the use of sculpture in Greek and Roman architecture are in force at the present day; and this is quite natural, as most of our art, sculptural art especially, has been directly derived from the inspiration of the Græco-Roman artists. They no doubt understood the problem better than we do, hence their greater success. Another matter, wherein they had the advantage over us, was that their appreciation of sculpture was such that they did not hesitate to employ the greatest artists they could find on the sculptural adornment of their buildings. Money and time were no object with them where art was concerned; nowadays, unluckily, they are the chief objects—so art comes off halting.

In England much of the sculpture which is to be seen in connection with architecture is Gothic. I have never been able to understand that, because you construct a building with certain traditional forms of architecture, you must therefore introduce the human figure, and indeed all other natural objects that are used as adornment, in a manner as grotesque and unnatural as possible. When the old English sculptors carved all the charmingly quaint old kings and saints on Wells Cathedral, they were not intentionally quaint and odd—they did their work in simple faith, and made it as good and as natural as their art would permit. Now we go to a Gothic sculptor, who carves kings and saints as he knows they never were, and gives them draperies harder than cast-iron and crinkly as paper. The result is a self-conscious caricature of the naïve, unconscious work of the older artist. Why is this so? Because we are in a groove and cannot easily get out. Moreover, the public are used to seeing these things, and ask for no better; and lastly, the things themselves are cheap to produce.

Whether statues in Gothic architecture will always be caricatures or not, I cannot say; certainly the modern work gives me no pleasure, although I am a great admirer of some of the genuine old statues. Yet, with all my respect and reverence for those early English Masters, there was one use to which they put sculpture that I cannot approve—I mean when they put a series of figures, one above the other, all round an arch. The figures at the bottom are fairly comfortable no doubt; but as they approach the point of the arch they are so far out of plumb that they suggest only extreme discomfort to themselves and apprehension to those who pass under them. To place a figure visibly out of balance is so flagrant a sin against all the canons of art, that one can only wonder that down to the present time architects and sculptors have not struck against it.

There is no doubt that in almost every school and age we can find instances of misapplication of sculpture, the Moorish alone perhaps excepted; but to this



honourable mention they are indebted, not so much to their art, great as that is, as to their religion, which forbade them the use of sculpture in its noblest form, thus saving them from much vexation and trouble, but depriving them also of what would doubtless have given a greater value to their architecture. Their Venetian enemies had no such scruples, and we constantly find them doing curious things with sculpture, notably the placing of the bronze horses taken from Constantinople half way up the façade of St. Mark's.

There seems to be no special reason why they should have gone up there; so I can only suppose that, having never had live horses in Venice, they did not know any better, and thought it was a good conspicuous position,—and since they are there no one now would wish to remove them. Nor are these the only horses in Venice that have got into queer positions. In some of the churches there are full-size equestrian figures of warriors, supported on brackets sticking out from the wall, half way up to the roof; they are, indeed, only of wood, but nevertheless they give one a rather unpleasant feeling of insecurity. One of the finest examples in Venice of how to treat sculpture in connection with architecture is in the Campo San Giovanni e Paolo. I refer to the celebrated statue of Bartolomeo Coleone [fig. 106]. This is certainly, and beyond all manner of doubt, the finest equestrian statue in the world. Statue and pedestal are most admirably designed for each other and for the surroundings. This great work, as is well known, was designed, but only in part executed, by Andrea Verrocchio, who died before its completion. The conduct of the work was then entrusted to Leopardi, by whom it was finished, cast in bronze, and placed in its present position. To Leopardi is also attributed the admirably designed pedestal, to which this monument owes so much of its effect. The Campo in which the monument stands not being very large, and being surrounded with buildings, some of which are of considerable height, Leopardi wisely decided to raise the statue, so that from most points it should have a sky background. The pedestal is a very lofty one, the base and cap projecting considerably beyond the die, the projections being supported on columns with elaborately carved capitals. The frieze is richly ornamented with sea beasts, shields, and arabesque work. The whole effect is most admirable, pedestal and statue forming together a grand and harmonious whole. It does not, indeed, harmonise with the adjacent buildings, and I do not think that it was intended to do so; it would be out of character if it did. The grand old Condottiere occupies the whole Campo, as no doubt he would have done if still in the flesh.

But Venetian sculpture is too large a subject, and, like that of most Italian schools, would demand a volume to itself; it is perhaps sufficient to say here, that although the sculptors of that school were many of them men of great skill both in architecture and in sculpture, yet their sculptural decoration seems to have been, with few exceptions, rather trivial in character and hardly on a par with that of the rest of Italy.

The Florentine artists of the Renaissance had more strict ideas, and we do not often find them in fault,—unless, indeed, it be that occasionally the leading part seems to be assumed by sculpture when we should have expected to find architecture

predominant. This is notably the case at the Church of Or San Michael, Florence, where the whole interest of the building depends on the statues with which it is adorned. These are so interesting that one passes the architecture unnoticed and forgives the want of subordination. The statues are not put there to adorn the building, but to make us forget it altogether.

I confess to something of the same feeling with respect to the bronze doors of the Baptistery in the same city. That these are glorious works of art every one must admit; but they certainly were not conceived or executed by Ghiberti with any idea of enhancing the beauty of the architecture, nor even of harmonising with it. In truth, I fear that they do neither, and that far more simple doors would have been more in keeping with the surroundings. This, however, is only a case of the audacity of the artist being pardoned on account of its success.

In the Loggia dei Lanzi there are, as you all know, many admirable pieces of sculpture. These, however, do not, and cannot, come into conflict with the architecture, as they bear no relation whatever to it, but are merely placed there for shelter. The building would be just as admirable without them; though, of course, one would miss them, just as one misses the grand piano if it is removed from the drawing-room. They are, however, only furniture, like the piano.

The Medici Chapel, again, is an instance of architecture being intentionally placed in a subservient position to the sculpture it contains. Nor is one disposed to find fault with this arrangement, since the Chapel exists for no other purpose than to contain these masterpieces of the greatest artist of the Renaissance.

Here we ought not to omit mention of the colossal David which for three centuries stood at the door of the Palazzo della Signoria. As the history of this statue is well known, we are aware that, until it was finished, no one, not even the sculptor himself, had the least idea where it was to be placed, no more than if he had been working for our Royal Academy. We learn from Grimm's *Life of Michael Angelo* that the authorities had great difficulty in coming to any decision as to the site; and that finally it was placed there chiefly because they had nowhere else to put it. It had, as I have said, no connection whatever with the architecture, and I think it quite probable that when first erected it looked odd enough; but it is, I think, impossible to form a dispassionate judgment on this point. From childhood we have all been familiar with representations of the Piazza, with its sculpture, and the gigantic marble boy at the door of the palace; and now that he has departed and his old place knows him no more, we miss him, more, perhaps, than we ought, when we consider him—or, rather, try to consider him—in connection with the architecture.

The Romans seem to me to have used their sculpture with more restraint, and more consideration for architectural harmony, than either the Venetians or Florentines. The only exception that I can at present remember is the fountain of Trevi, which occupies and entirely eclipses the end of the Palazzo Poli. This, however, is not a case of accident, nor of misplaced ambition on the part of the sculptor; it was done with equal deliberation and success. The Piazza is small,





FIG. 106.—THE STATUE OF BARTOLOMEO COLEONE, VENICE.

Begun by Andrea Verrocchio and completed by Leopardi. (From a photograph)

irregular in shape, and has no architecture except of the most ordinary description. The Palazzo Poli itself is very irregular, being wedge-shaped in plan, the edge of the wedge being truncated and occupying one side of the Piazza Trevi, with a street leading off on either side of it. Salvi's magnificent fountain, with its marble statues and ever-rushing waters, is a decoration for the little piazza which makes one forget its commonplace, I might almost have said squalid, character, and makes one forget also that it is really one end of a palace.

Rome certainly is wonderfully rich in fountains and ecclesiastical sculpture. The monuments of her illustrious men are almost all to be found in her churches; I can remember only one other exception: Marcus Aurelius on the Capitol. In all probability, since I left Rome in 1876, there have been monuments erected in the public streets and piazze after the fashion of the rest of the world elsewhere; but there is no doubt that, during the Renaissance and until that date, all monuments went into churches, or to the Campo Santo, and the streets and piazze were adorned with fountains,—a most admirable arrangement, in my humble opinion, but one which does not find general favour, or, at least, is not generally adopted. The fountains would take up too much time to describe here, and the one I have just mentioned is the finest example of the kind. When not built to form part of a palace they are occasionally constructed as an independent façade, as in the instance of the Aqua Paula on Monte Janiculo. I confess, however, that I like them better when they are built against a palace wall.

The churches in Rome offer such an abundance of material that it is difficult to know where to begin. Perhaps, however, architecture and sculpture harmoniously working together in monumental art can hardly be seen anywhere better than in the Church of Santa Maria del Popolo, to wit, in the Sforza [figs. 97, 98, 99, 100] and Basso tombs, both from the hand of the great master, Sansovino. These tombs are so rich in design both architectural and sculptural, and so perfectly harmonious withal, that they could only be produced by one to whom the practice of both arts was equally familiar. Such an artist is hardly to be found amongst us at the present date; nor do I see how else we could produce the strong sense of unity that one feels in every portion of these admirable works, unless an architect and a sculptor should habitually work together as some literary men have done.

In England at the present time the class of monument in vogue is usually an inexpensive affair, being merely, as to architecture, a simple pedestal, generally of granite; and as to sculpture, a bald representation of the deceased in his everyday dress, bareheaded, and without either overcoat, hat, gloves, or umbrella. He is usually in bronze; and we place this in the middle of a square, or where four roads meet, and then we wonder why our public monuments do not look better, and why they do not harmonise better with the architecture. The fact is that there is usually no particular architecture for them to harmonise with; and if there were, the sculptor would be powerless, as he is generally under strict orders from his employers to produce a statue of a certain height in a given costume and on a pedestal of a given type. The only



liberty he is allowed is to stand his figure either on the right or left leg ; and to increase the size of the monument, if he pleases, at his own expense. There are exceptions, but this is the general rule. Occasionally we have a chance—at least, some lucky ones have had—at something better than the portrait-statue on the granite base : for example, the Albert Memorial. Truly, I know that the finger of scorn has been pointed at that great work, as at most other things, and doubtless there are weak spots to catch the eye of the critic ; but it is so easy to scoff and find fault, and it is, indeed, a cheap way of putting oneself on a higher platform than one's betters. Your average man loves to criticise, because if A has done a fine work, then A must be a very clever fellow ; but if B can point out where A made mistakes, and say what he ought to have done, then B is cleverer than A. B also has the advantage in this, that the possible error of his opinions is never brought to the stern proof of practice. But, faults or no faults, the Albert Memorial is, in my humble opinion, a work of which we, as a nation, may fairly be proud. It was our first attempt, and a most creditable one, to realise the proper relationship of the three branches of art, and I cannot understand why the experiment has not been repeated, though of course we cannot expect often to have to erect monuments on so grand a scale.

If I may venture, after what I have said of critics, to express an opinion of the result of so much admirable and costly work, it would be that the weak point of the monument lies in its architecture rather than in its decoration. This is a most unusual fault, for, as a rule, the poorest sort of decoration used to be thought, and very frequently still is thought, good enough for architectural work. Indeed, none at all is too often the rule in England.

There are, as I have said, many maxims beginning with "Don't." I will only mention two or three of them. Don't turn a monument of the Duke of Wellington into a temple of Cloacina. I do not object to these structures ; they are useful, and need not be ugly or offensive ; but if they must have a statue, let it be one of the fair goddess, not that of our great hero. Don't leave your triumphal arches and gateways unadorned with sculpture ; and if you do happen to have an arch crowned even with an indifferent statue, don't take it down, unless you replace it with something better.

Hyde Park Corner is no doubt improved as regards the convenience of traffic ; but it is certainly a most unsatisfactory place, as far as sculpture in relation to architecture is concerned. There is the architecture and there is the sculpture, but what is the relation between them ? Scarcely, I think, what we should wish it to be, inasmuch as they seem to have just gone through the Divorce Court. The old Duke has been sent to Aldershot, on the plea that he was not suitable for his late exalted position. The new Duke has been placed out in the cold, probably because those whom it concerned could not see their way to incurring the responsibility of erecting a suitable statue on the old site. Thus the arch remains, shorn of its sculpture, though we have a statue of the Duke, plus four of his soldiers. This was shirking the problem, not solving it.

The gateway to Hyde Park is, indeed, not utterly devoid of sculpture, but it was a strange idea to adorn it with a copy of part of the Pan-Athenaic frieze. It is rather

apt to recall the fable of the jackdaw with peacock's feathers. I think there can be no greater sign of poverty in a nation's art than when we see the people, unable to produce any ornament of their own to adorn their pretentious monuments, willing to put up with what they can take from elsewhere. The Arch of Constantine is a well-known example of this want of art and of honesty.\*

Hitherto I have chiefly spoken of sculpture for public buildings, though I can well imagine with what admirable effect sculptural decoration might be pressed into the service of our domestic architecture. The friezes in our halls and reception-rooms might be rich with beautiful carving, and our doorways and chimney-pieces might be made noble works of architecture with sculptural accompaniment; but, alas! what might be is not, and for two or three very simple reasons. The first is the great cost which would thereby be added to the first outlay in building; the second is that men are more restless than of old, and an Englishman seldom lives his life in one house, nor does he usually feel any desire, even if he has the means, to build a palace to house himself and his children, with their families, all under one roof, as was the custom in Italy at the time of the Renaissance. What English merchant of the present day, even if possessed of the wealth of Messer Luca Pitti, would ever venture to build a Pitti palace? If he had the whim, he would be afraid to indulge it for fear of ridicule. It is true that here and there a house may be found which might almost be called a palace,—such as Mr. Holford's in Park Lane, where the chimney-pieces, by Alfred Stevens, are so well known from the models at South Kensington that I need not here further describe them, save to say that Mr. Holford, Lewis Vulliamy, and Alfred Stevens, were quite successful in solving the problem between them.

I venture to think that there is another trouble that prevents sculpture being properly employed in domestic architecture, that is, our system of building on leasehold property. Obviously, if a man build a house that is to be his only for a given time, he will probably build and decorate it in such a manner as to give the least he possibly can to the stranger to whom it must revert at the close of his tenancy. Until houses are built on freehold instead of leasehold property, I do not see that sculpture can ever take a serious part in adorning domestic architecture. Four things are needed, and four only: first, a freehold for the site; next, a liberal employer—I use liberal in the widest sense of the word, not only of hand, but of mind; a cultivated architect; and lastly, a sympathetic sculptor. Whenever and wherever these come together there can be no real difficulty in solving the problem of the true relations of sculpture and architecture.

GEORGE SIMONDS.

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\* \* The Discussion [see verbatim report in *The R.I.B.A. Journal*, Vol. VII.,

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\* The opinion of Gibbon on this point, written and published more than a hundred years ago, may be usefully quoted here:—"The triumphal arch of Constantine still remains, a melancholy proof of the decline "of the arts, and a singular testimony of the meanest vanity. As it was not possible to find in the capital



pp. 225-228] was opened by Mr. H. H. Statham, and continued by the President, Professor Kerr, and Mr. J. M. Brydon. A brief abstract of their remarks and of the reply made by the author of the Paper is here appended:—

MR. H. H. STATHAM, *Fellow*, agreed it was entirely true in one sense that the arts ought always to be considered in relation to each other, and there was great gain, in certain directions, by their being used in connection with each other. But it was often forgotten that painting and sculpture, when used in connection with architecture, had both to give up something; and he urged that architecture was not, after all, dependent even for her highest effects upon the addition of sculpture, although he agreed that its addition added another glory. When one stood beneath the dome of the Pantheon, looking up at the great eye in its centre, he did not think of the sculpture; he thought of the architect's conception—of the conception of the plan in the first instance, which was the foundation of the thought embodied in the building, and was itself a form of design. When sculpture was made a part of the architectural whole, it became more or less conventional sculpture, with little movement or life in it. A question not touched upon by Mr. Simonds was, were they to ornament modern buildings with classical subjects, or to do as the old Greeks had done, represent their own life on the buildings? It was a question that had not been fairly answered yet, although he thought the French had partly solved the difficulty, as in the beautiful monument to Regnault, which gave a portrait bust only, in the midst of architectural surroundings. As to ornate capitals, he considered their bad effect was not in the ornament, but in its being used in too high relief; richness of ornament was not bad if kept in low relief. It was a curious question why the Greeks put metopes in high relief on the top of their buildings, and low relief in the frieze of the same building. He was inclined to think the Parthenon frieze should have been down below. In regard to St. George's Hall, he thought the introduction of marble with stone rather an unhappy thing to do, and quite contrary to the intention of the architect. He agreed with Mr. Simonds as to the decoration of ceilings with pictures, and as to not moving the monuments in Westminster Abbey; and expressed hearty sympathy with Mr. Simonds's remarks about modern mock mediæval sculpture. He strongly dissented, however, from Mr. Simonds's opinion that the new Wellington statue should have gone to the top of the arch, because its architectural design required a finial fronting the same way as the arch, which the statue would not do.

THE PRESIDENT said it was, perhaps, the reverence expressed for some sculptors which prevented their employment with architects, who felt that many of them had so great a reputation as artists, that any attempt on the part of the architect to dictate to them would be out of place; and thus there appeared often a want of sympathy in recent monuments between the sculpture and the architectural surroundings. With regard to Mr. Statham's remark, he thought the metopes of the Parthenon had been carved in high relief because they were placed under a cornice which threw a deep shadow.

PROFESSOR KERR, *Fellow*, considered English architects for many generations past had been deficient in practice as regarded applied ornament. The beneficial use of sculpture as an ancillary art to architecture was what Mr. Simonds had suggested, but, as the President had practically said, an architect did not like to dictate to a sculptor of equal eminence with, or perhaps greater than, himself; and even French architects, with their peculiar qualifications for being, as Mr. Simonds said, masters of the situation, could not always get the sculptor and painter to work harmoniously with them. It appeared to him that, if English sculptors were to have the advantage of working upon English buildings, they must do their work on such a scale of expense as ordinary Englishmen would pay, and as the French and Germans did pay. In the view of the unity of art—a doctrine which he thought was coming very much to the front—one looked at all artists as on an equal platform, each contributing in his own way to the enjoyment of the people. The Albert Memorial had been referred to as an example—

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“of the empire a sculptor who was capable of adorning that public monument; the arch of Trajan, without any respect either for his memory or the rules of propriety, was stripped of its most elegant figures. The difference of times and persons of actions and characters, was totally disregarded. The Parthian captives appear prostrate at the feet of a prince who never carried his arms beyond the Euphrates; and curious antiquarians can still discover the head of Trajan on the trophies of Constantine.”—*The Decline and Fall of the Roman Empire*, chap. xiv.

and a very excellent example it was. No doubt much English sculpture was bad, but he ventured to maintain that a very great deal of it was of exceedingly high merit, and that a great deal of the public statuary of the present day was worthy of the highest aspirations of the artistic sculptor.

MR. J. M. BRYDON, *Member of Council*, said the principal difficulty in public buildings was, that architects had not enough practice in introducing sculpture, because there was not the money for it, and they were simply obliged to take advantage of plain spaces.

MR. GEORGE SIMONDS, in replying to Mr. Statham, could not see there was any evidence of sculpture having to suffer when placed in immediate connection with architecture, giving as an example the frieze of the Mausoleum at Halicarnassus, where the sculptor did not seem to have been under any restraint, and than which he could imagine nothing more sculptural. He did not object to high relief, except in works very high up, when one was unable to get further off than the other side of the road; and he agreed with the President's remarks upon the metopes of the Parthenon. As to the sculptures in Westminster Abbey, many were abominable and hideous, but at the same time they were historical, and sentiment could not be detached from art. He disclaimed any intention of falling foul of British sculpture, and agreed that it would be very advantageous if leading sculptors could work at a sufficiently low price to enable architects to employ them; but it was not the fault of the sculptors or of the architects, but of the employers, who would not supply sufficient money. There was no other country where there would be any school of sculpture at all under such discouragement as British sculptors had to experience; but he did not think there was any lack of talent.



LXXXIII.

ORIGIN AND MUTATION IN INDIAN AND EASTERN  
ARCHITECTURE. By WILLIAM SIMPSON, R.I., M.R.A.S., *Hon. Associate*.

Mr. Alfred Waterhouse, R.A., *President*, in the Chair.

MR. PRESIDENT AND GENTLEMEN,—

THE title of this Paper has been chosen so as to admit of material from more than one locality being brought under consideration. The rambling from one region to another, thus indicated, will anticipate a character of the Paper which I fear can scarcely be avoided; it is intended to deal with a number of subjects somewhat varied in character, but I hope to preserve some continuity by limiting myself to roofs, domes, barrel-roofs, and arches. Theories of origin and mutation will be given. Some of these, I think myself, are fairly well substantiated, but others, again, I offer as little more than guesses, which require further data before anything like certainty can be declared regarding them; still, I feel sure they will be of interest to all students of architecture, as they deal with some of the oldest constructive forms in India. One merit I may claim for this Paper, which is that it will bring forward some entirely new material from a rather out-of-the-way region,—namely, Afghanistan and Central Asia; countries in which I believe much will be found when they are so opened up that their remains can be properly studied.

THE ORIGIN OF THE CHINESE PAGODA.

The first subject I shall bring before you is the well-known Chinese pagoda, and I think in this case that the explanation of its origin about to be given will be found to be more satisfactory than a mere guess. My experience, moreover, will show how much may depend in archæological research on very small things: how a rapid sketch, in passing, of an old stone by a roadside turns out to have a value, because it just chances to contain a connecting link that clears up what before seemed an insoluble problem. For twenty years or so there was a slight sketch in one of my sketch-

books, and during that time I had not the faintest notion of its value. When I was in China,\* as far back as 1872, knowing that the pagodas of that country had been the subject of much speculation as to their origin, and that no satisfactory conclusion had been arrived at, I inquired about them of those scholars who had made the literature of China their study. The Chinese themselves give only one explanation, which is, that they owe their erection to something like what we should define by "good luck"—or that they shed a beneficent influence on the locality around them. That is the popular idea. The learned say that according to ancient writings the idea or the design of the pagoda was brought from India along with Buddhism, and that they were copies of Indian structures. The authorities I consulted were unanimous in this statement, affirming at the same time that the Chinese books allowed of no doubt on the subject. I asked if they could tell me anything about the same structures in India; but on this head they could say nothing, and they did not seem to appreciate my declarations that there were no remains of such monuments in that country. I had to be satisfied with what these scholars told me, which turned out ultimately to be quite correct. At the time I made a guess regarding the origin, which was that the Buddhist stupa or tope † was the structure; but how the umbrella, or triple umbrella,—the form with which we were then familiar,—which surmounted the stupa, had grown into a tower, or rather into a series of rooms, each with a roof, placed one above the other, was a mutation presenting a puzzle rather difficult to solve. Still the stupa seemed the only explanation, and yet it was only a suggestion; it required something in the shape of direct evidence, which was not then forthcoming. The minar of the Mohammedan mosque was post-Buddhist, and this as a possible origin was out of the question. The Chortens, monuments similar to the stupas, are surmounted, in Tibet, by a sort of column, surrounded by a series of rings, always of odd numbers; but these are so unlike Chinese pagodas that no help can be derived from them. Now, I have no hesitation in saying that these rings have the same origin as the pagoda roofs.

We did not at first know whether the pagoda had been taken from India by sea, possibly making stages of Siam and Cambodia on the way; or if it went eastward over the Himalayas and Tibet. The last turned out to be the route; but before this could have been made certain it will be seen that a knowledge of the stupas north of the Indus was necessary. Only foundations of these monuments were found in the Peshawur district, and it was not until the war with Afghanistan in 1878–9 that I explored the "Buddhist Architecture in the Jellalabad Valley," and found how the details of the stupas there differed from those south of the Punjab. In the Paper ‡ I read on this subject I

\* See Mr. Simpson's Paper on "The Architecture of China," in *TRANSACTIONS*, 1873–74, pp. 33–50; and his Paper on "The Architecture of India," in *TRANSACTIONS*, 1861–62, pp. 165–178.

† *Stūpa* is now generally used instead of *Tope*; it is the old Sanscrit word, and "tope" is said to be a derivative from it, the S having dropped out. *Tope* is the native word employed in the North and in Afghanistan; in Ceylon *Dāgoba* is the term, and the same monument in the rock-cut Buddhist temples is called a *Chaitya*; *Dung-Ten*, and *Chhod-Ten*, sometimes pronounced Chorten, are the Tibetan words for the same. I give these here as I may have to use most of them, but I shall endeavour to give the word "stupa" wherever it is possible to do so.—W. S.

‡ *TRANSACTIONS*, 1879–80, pp. 37–64. Mr. Simpson's restoration of the Ahin Posh Tope is at p. 55.



produced a restoration of one of these stupas. My sketches supplied me with all the details up to the tee and the umbrellas; in none of the remains were these parts to be found, so I added them according to the Indian examples. These Afghanistan stupas presented some points of difference from those in the south; most prominent was a square base, of some height, on which the circular part of the stupa rested; they had stairs leading from the ground to the upper part of the square base; and opposite the top of the stairs, on the circular base of the stupa, there was a large figure of Buddha in a niche.

Bearing these details in mind, I must now take up the sketch which threw light upon the whole subject. As far back as the summer of 1861, while I was travelling in the Himalayas, at a place called Dras, about a march beyond Kashmir, I came upon a couple of old sculptured stones which had been erected like pillars on the road-side. These I made some slight sketches of, and it was not till about twelve months after reading the Paper above mentioned, that I chanced to look over the book they were in. My surprise was great on finding that one of them was a representation of a northern stupa [fig. 107]. The square base is quite distinct upon it, with the stair leading up; and facing the top of the stair is a niche with the figure of Buddha; but the important point in this sculpture was that it contained the tee and the umbrellas—the first complete representation of these forms that had been discovered. Instead of the triple umbrella there were thirteen of these, forming a high spire which stood up above the stupa. The sculptures on the Sanchi Tope show the umbrellas as comparatively small articles in comparison with the size of the tope, but here the lowest umbrella is quite as wide as the circular drum of the stupa.

This steeple of umbrellas was a new revelation to us regarding the form of the northern Buddhist stupas, but it fitted in perfectly with some slight knowledge we had. Fragments of small models of such monuments had been previously found: one had more than three umbrellas, and another had these symbols as wide in their diameter as the stupa beneath it. Perhaps the most complete confirmation of the accuracy of this sculpture was the Chinese pilgrim's description of

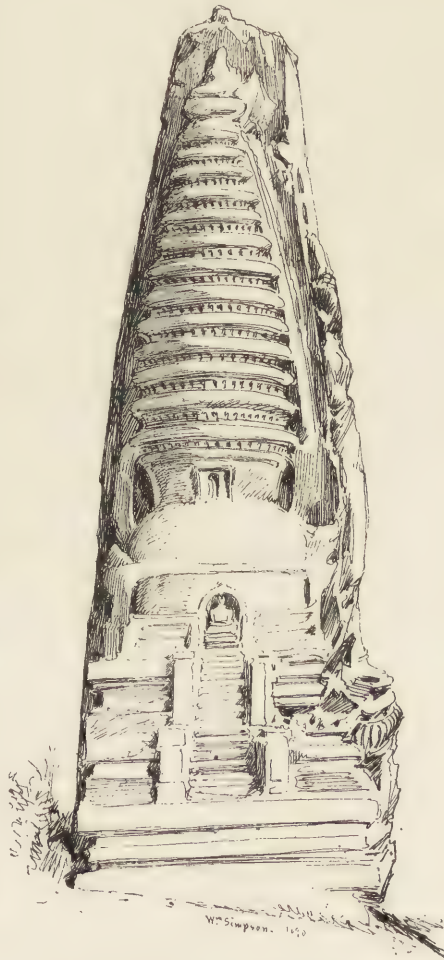


FIG. 107.—SCULPTURED TOPE AT DRAS,  
IN THE HIMALAYAS.

the great stupa at Peshawur, which was at least 400 feet in height, and with as many as twenty-five umbrellas of gilded copper.\* These umbrellas placed one above the other, as in the sculpture at Dras, explain the height of the Peshawur stupa, which, as far as we know, was the largest in India in Buddhist times.

Here the solution of the Chinese pagoda was found. All was plain. It scarcely required a thought. The usual pictures of these pagodas show a house between each roof, but those about Pekin and the northern part of China have only one room at the base, and the roofs rest on each other, exactly like the umbrellas of the sculptured stupa. I can name one or two pagodas that I have seen at Pekin—one is Tien-Ning-Si Pagoda, on the outside of the western wall of Pekin; and the Pa-Li-Chwang Pagoda, on the north of Pekin [fig. 108]. There is another at Tung-chow, on the Pieho, about fifteen miles to the east.† The second and third of these pagodas have in each case thirteen roofs—equal in number to the umbrellas of the sculptured stupa.

The change from the circular form of the stupa to the octagonal form of the pagoda resulted from a peculiar symbol which is said to be the foundation of Chinese religion, morals, and philosophy, and is the exclusive subject of the *Yih-King*, one of the oldest sacred or classical books of China. It is called the *Pah-Kwah*, or “eight diagrams,” from its forming an eight-sided figure.‡ Another marked change is that the umbrellas have been transformed into regularly constructed Chinese roofs.

To this I can add some slight historical data. The following quotation, so far as it goes, fully supports what has already been said:—“The number of pagodas in China is very great. There are nine within thirty miles of Shanghai . . . At Lo-Yang, in the Tsin dynasty [A.D. 350], there were forty-two, from three to nine stories high, richly painted, and formed after Indian models. The word *t'a* [formerly *t'ap*], now in universal use, has displaced the older names *feu-t'a* [*budu*] and *fo-t'u* [*buddu*]. The original purpose of the edifice was to deposit relics of Buddha. These relics might be a hair, tooth, metamorphosed piece of bone, article of dress, or rice-vessel. When bodies of deceased Boddhisattwas and other revered persons were burnt, the remains were placed in structures which received the same name, *t'upa* or *st'upa*, and it is these that have been described by travellers in Afghanistan and other regions where Buddhism formerly prevailed as *topes*.”§

Professor Beal mentions the forty-two pagodas at Lo-Yang, as having been “formed after Indian models”; || he also gives some details which help us to arrive at

\* The late Professor Beal's translation says: “twenty-five circlelets of gilded copper on a staff.” M. Julien translates: “Sur le sommet du Grand Stoupa, il élevo encore une coupole en cuivre doré qui avait vingt-cinq étages.”—W. S.

† There is an illustration of this one in Fergusson's *Indian and Eastern Architecture* (ed. 1876), p. 697.

‡ I have very little doubt of this explanation, but my authority for it might be termed as only casual. I was inspecting a very old pagoda, wholly constructed of iron, at Chinkiang on the Yangtse-Kiang; a friend in the Consular service was with me, who could, of course, speak Chinese. It chanced that a Buddhist monk came up to us, and through my friend I managed to get two or three questions about the pagoda answered, and one was if its octagonal form was in imitation of the *Pah-Kwah*, to which the answer was in the affirmative.—W. S.

§ *Chinese Buddhism*, by the Rev. Joseph Edkins, D.D., pp. 134-5.—W. S.

|| *Introduction to Fah-Hian*, p. xxiv.—W. S.



a date. He says that a Shaman called Dharmarakcha came from the western countries bringing a large number of Buddhist and Brahmanical works, which he presented to



FIG. 108.—THE PA-LI-CHWANG PAGODA, NORTH OF PEKIN. (From a photograph.)

the Imperial Court. This man took up his residence at Lo-Yang, now known as  
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Honan, with other Shamans, from 265 to 308 A.D., where they were employed translating Buddhist books. There need be little doubt but that these Buddhist monks introduced the *stûpa* or pagoda into China; and it may be also assumed that they came from the "western countries," or India, *viâ* Afghanistan.\*

In tracing an origin in this case we find a history which might be described as containing a rather romantic instance of mutation. In a tropical region an umbrella is a useful article as a protection from the sun's rays. At an early period, some primitive chief, some Dahomey of the time, must have claimed such an article as his distinctive mark of rank. A large and decorated umbrella, either on occasions of state, or even in battle, would indicate the presence of the king, and it thus became a royal symbol. It did, in fact, acquire this character over a large portion of the East. We see it in the Assyrian sculptures. In India, the *chhatr*, or umbrella, is well known as one of the royal insignia; it is so used by the Viceroy of India at the present day, and a white umbrella was the sign of sovereignty with the Mohammedan emperors of India.†

I have seen and sketched the triple umbrella of state belonging to the Emperor of China. The umbrella being a royal emblem, it became a sacred one, and was placed over figures of Buddha‡ and stupas; when the stupas were brought to China and converted into pagodas, the umbrellas were changed into regularly constructed roofs.

#### THE HINDU TEMPLE: ITS ROOF OR SPIRE.

The next subject of consideration is one on which I can only express myself with great hesitation, and any suggestion of origin I may offer must be accepted as little more than a guess. The difficulties in this case will be understood when I state that Mr. Fergusson had had it in his thoughts for fifty years, and had all but given up hope of a solution being found. The origin, in this case, is that of the *sikhara*, or spire, of the Hindu temple. It may be as well to describe this temple. They vary considerably in size, but are never very large; they are simply formed of a square cell, with a small door only on one side, through which the worshipper sees the image

\* On realising the value of the old sculptured stupa, I submitted it at the time to Fergusson, who recommended that it should be brought before the Royal Asiatic Society. I made a drawing of it; and, in December 1881, read before that Society a short Paper entitled "A Sculptured Tope on an old Stone at Dras Ladak," which is published in the Society's *Journal*, vol. xiv. N.S., pp. 28-38.—W. S.

† Elphinstone, in his *History of India*. See also Sir John Malcolm's *History of Persia*, 4o. Lond. 1815, vol. i. p. 271, note. The latter says "satrap" is "a corruption of *chattrapa*, or 'Lord of the Umbrella of State,' " which, it is probable, these provincial rulers only were allowed to bear. The distinction of bearing an umbrella "is common to many countries of Asia; and that it was known in Persia, there can be no better evidence than "the sculpture of Persepolis, where the umbrella of state often marks the prince or chief, of the group of figures. "*Chattra*, which signifies 'umbrella,' is a term common to Persic and Shanscrit. *Pa*, a contraction of *Pati* "(i.e. lord), is now lost in the former though preserved in the latter language. The name, or rather title, of "*chattrapati*, or 'Lord of the Umbrella,' distinguishes one of the highest offices of the federal government "of the Mahratta State."—W. S.

‡ The *Mahawanso* describes Buddha as the bearer of "the triple canopy, the canopy of the heavenly host, "the canopy of mortals, and the canopy of eternal emancipation." Possibly the *Baldacchino*, or baldachin, is a Western descendant of the Oriental *chatta*.—W. S.



or symbol of the deity. The spire is a continuation of the four sides of the cell, which tapers with a curve, but not to a point; on the summit there rests a large circular object like a pad—this is known as the *âmalaka*, but what it really is, or what its origin may be, we know nothing. Above this there is generally a vase, or water-jar, called the *kalasi*; as to why this object was originally placed there, or its signification, we are also entirely ignorant\* [fig. 109]. It will be understood from this that not only the origin of the *sikhara* itself is shrouded in mystery, but at the same time the distinctive features upon it are equally so.

The principal reason for this ignorance is owing to the absence of monuments representing the steps by which the Hindu temple was developed to its complete form. If we take the group of splendid temples at Bhuvanes'vara, which are about the oldest Hindu temples, we find a style which has reached its full growth. There is no uncertainty in any of the parts; each form is defined and settled; the plan had attained to a recognised type; the decoration, although varying in each temple, is rich, elaborate, and beautiful, implying a long experience before such a result could be achieved. The difficulty is to account for this perfected style without the earlier efforts; which as yet have not been discovered; perhaps they may exist, and may in time be found; but it is at least curious that a series of temples, which ought in all probability to have extended over a century or two, have entirely disappeared. The beginning of the Bhuvanes'vara temples was about the sixth century; and it has been suggested that Hindu temples previous to that date may have been of wood, and that would easily account for their non-existence. I have no doubt that the Hindu temple did originate in wooden forms; but the transition from that material to stone must have taken place a long time before the Bhuvanes'vara temples were constructed, for those

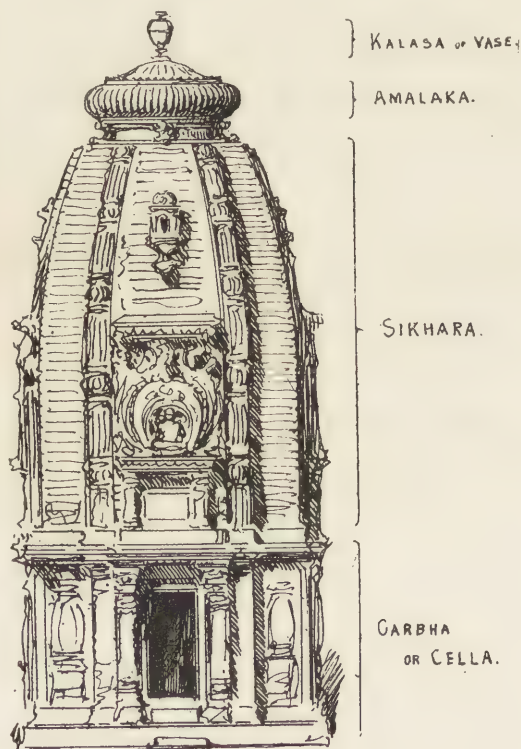


FIG. 109.—SKETCH OF THE HINDU SIKHARA.

\* I have had a long correspondence on this *kalasi* with a gentleman in the Bombay Civil Service, a small portion of which was published in the *Journal* of the Royal Asiatic Society. My friend is very familiar with the local customs of India, and he has supplied me with some curious details, but we cannot come to a decision as to whether the *kalasi* on the *sikhara* is a relic-holder, or the water-vessel, which may have become a symbol from its use in the ceremonial rites.—W. S.

temples manifest a course of development, even in the stone material, which implies a considerable length of time. Here is the difficulty with the origin of the Hindu temple—we find it a full-grown man who knows nothing of his birth, his babyhood, or boyhood. It appears in its maturity, and no relic or history of the past exists to enlighten us.

Those who begin the study of Indian architecture generally, as a first plunge, assume that the Hindu temple and the Buddhist stupa are similar developments, or that the one has sprung from the other. This was the idea that occurred at an early period to my own mind; but a very slight familiarity with the two forms soon dissipated the notion. I do not feel entitled to say that the transition of the stupa to the sikhara is impossible; but it seems to me not at all a change likely to have taken place. There is the first step from the circle to the rectangular in the plan. This might have taken place; but the great difficulty which weighs with my mind is, that the stupa is a solid mass, while the Hindu temple is a hollow structure formed of walls. This has always appeared to me as a difference which points to a separate origin; and yet in the transition from the stupa to the pagoda we have this very marked mutation from the solid form to a chamber with walls, as well as the circular plan becoming octagonal. Still, these changes were explained as resulting from the combination of certain ideas peculiar to China in the construction of the monument, and thus producing an alteration in the character of the structure, which would not be so likely to occur in India, where the particular type was established. As already explained, we have not found the progressive stages which produced the Hindu sikhara, and there is another stage also missing, and which would also be necessary as evidence in this case—that is, the preliminary changes of the stupa towards the form of the sikhara. The sculptured stupa at Dras supplied this requirement in tracing the origin of the pagoda. In no case that I know of in India do we find the solid dome-shaped stupas tending to the square form, or any approximation in them to become a chamber formed of walls.\* We should require both of these changes in this case, and both of them taking place simultaneously, but they are nowhere to be found in the region where they are wanted. The chance of the stupa being changed into the sikhara, although nothing in the shape of demonstration can be produced against it, seems to me a most unlikely thing to have occurred. On the downfall of Buddhism there must have been thousands of stupas existing in India, but, being solid and having no cell, the worshippers of Mahadeo could not place a “linga” in them, nor the Vaishnavites find a seat for the figure of their deity. As the stupas could not be utilised,† they were allowed to fall to pieces, and that is the reason why at the present

\* The old temples of Burmah present a mixed character, which might be described as that of the stupa and the Hindu temple combined; but, so far as we yet know, these are probably a combination of Indian forms, and do not represent a process of development. It should be added that our knowledge of the architectural remains of Burmah is not yet sufficient to enable us to speak with certainty about them.—W. S.

† The early Christians were able to seize upon the basilicas and use them, and in using them developed the type of the Christian church; but a similar adaptation in the case of the stupa and the sikhara is out of the question. That the Brahmans did utilise Buddhist buildings I can produce a small amount of evidence for. When I visited the Karli Cave, which is well known as one of the finest Buddhist chaitya caves of Western



day there are only a few of these monuments remaining. If the Brahmans had used them for any purpose many of them would have been preserved, and thus become the links of evidence in the chain of mutation.

#### THE PRIMITIVE USE OF BAMBU AS A BUILDING MATERIAL.

The wooden origin of Indian architecture has long been recognised, but the claims of bambu to some share in this origin have been, I think, overlooked ; so far as I know, it has only been in the case of the Bengal temple, with its imitated thatch roof, that any connection with it and an architectural form has been admitted. In most parts of India the bambu is to be found ; in Bengal and the South it is very plentiful. As a material it has many peculiar merits ; it is strong and flexible ; it would be hard to suppose that its capabilities were not utilised in early times as well as in the present day. Although not in use now for architectural purposes, it is, where plentiful, applied in numerous ways. A friend who travelled in the Himalayas among the Lepchas, in the Darjeeling district, told me he never required a tent—for at the end of a march his Lepchas in a very short time constructed with their large knives a most comfortable bower for him with the growing bambus. Bridges are made with them in the same locality ; all the household utensils are bambu, from the bed to a stool, from the water-pail to a drinking-cup. We are familiar with bambu details in Chinese houses. In Bengal, as well as other places in the South of India, it forms the framework of cottages and roofs ; scaffolding for building and temporary erections are almost always made with it. A material that is so useful, and employed in so many ways, must have also served the purposes of the primitive man when he had reached the stage of constructing a hut or permanent dwelling for himself, and for a long period of time afterwards. I have dwelt on this serviceable character and use of the bambu, for I wish to ascribe two distinct forms found in Indian architecture to this source, as their probable origin.

It is not uncommon in India, and, as far as my recollection serves at the moment, more frequently in Bengal, to see a long piece of bambu, with a bit of rag on the end of it, projecting high in the air from a tree. This serves the purpose of a sign, and indicates the neighbourhood of a small shrine, or the abode of some holy man, who hopes thereby to attract visitors, and by this means to receive offerings for his

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India, I found it in the charge of Brahmans as a Saivite temple, the chaitya or stupa being looked upon by them as the "linga." Here we see how a Buddhist shrine could be put to a practical use at once by the triumphant faith. The rock-cut examples of this particular kind of temple are evidence that others of a structural character existed, and these no doubt were also seized upon by the Brahmans. We have even a trail of evidence that such was the case, and that the Brahmins constructed temples which were more or less in imitation of chaitya halls. The plan of the kailasa at Ellora shows this ; the temples at Aiwulli and Pittadkul are further evidence of the same. We are indebted to Dr. Burgess for discovering and describing these two temples ; and Fergusson attached, and justly so, great importance to the Aiwulli temple, simply from its being derived from the Buddhist chaitya hall. Low sikharas were constructed over the cells of these temples, but in each case they were Dravidian in style, and quite distinct from the character of the northern sikhara, which is the one under consideration.—W. S.

support. I should not like to affirm positively that this piece of bambu is the still existing first germ of the sikhara; but it is not beyond the bounds of possibility that such is the case. All that is necessary in the Hindu temple—such as it exists to-day, where the worship of Siva is carried on—is the small square *cella*, and the elongation upwards into a spire only serves the purpose of indicating, like the bambu and the flag, for some distance round, the position of the shrine. Whatever may have been the purpose of the primary sikhara, my suggestion is that this form of temple was first constructed with bambus. The cell could have been easily formed by means of bambu posts, and the sides covered with reed mats.\* I take it that the four bambus at the corners would rise higher than the cell, and that they would also be covered in some simple manner, either to mark the position of the temple, or to add to its appearance and importance.† Now this last operation could not have been accomplished without binding the bambus together in some way, and this could scarcely be done without the upper ends, particularly as they taper upwards, bending inwards, and thus reducing the width of the spire at the top. Here, in this simple construction, we find that the exact outline of the sikhara is produced. In temples of a late date, the bend or slope begins almost on the top of the cell, and the later the temple the more marked this is; but in the oldest examples, such as those at Bhuvanes'vara, the line rises quite straight for some distance above the cell, and only bends a little at the summit.

If this should turn out to be the correct solution, it covers the main difficulty, and explains the chief problem connected with this architectural structure. The bambu theory explains, in what seems a simple and satisfactory way, the first origin of the peculiar form of the sikhara. This form, it may be supposed, would become in the course of time an established type—similar to what we know has taken place so often in the architecture of other countries—and when a more solid and substantial building was required other kinds of timber would be employed. Logs of wood that could be cut into beams and planks would be used. The old outline would be strictly adhered to, but with the changed material new forms in the details would begin to appear. Metal ornaments would be a likely addition; the natives of India are very clever at producing articles in tinsel, and such articles, with garlands of flowers, would, I feel sure, be added on festival days. Rich drapery would be another mode of ornamentation; and we know, from remains of old buildings in India, that festoons of gems and strings of pearls were common means of architectural decoration.‡ These details are

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\* In the *Satapatha Brāhmaṇa*, which is a book of ritual dating at least three or four centuries B.C., we have references to the peculiar structure which was used at that date. It was a temple very different from the Saivite temple of modern times, but it was made wholly of posts and reed mats, these last forming the walls, as well as covering for the roof. The altars were merely earth heaped up. Every part was thus produced by the most primitive means [see "A Primitive Brahmanic Temple," *infra*, p. 266].—W. S.

† The small cell of the Saivite temples produced in most cases a most diminutive structure; but the worship being individual, and not congregational, a large hall in which a body of people can assemble is not required, and the building might be described as only the adytum of a temple.—W. S.

‡ In support of this I give the following from *Buddhist Records of the Western World translated from the Chinese of Hiuen Tsiang* (A.D. 629), by Samuel Beal. 8o. Lond. 1884. Hiuen Tsiang describes a vihara at Buddha Gaya:—"Its projecting eaves, its pillars, beams, doors, and windows, are decorated with gold and "silver ornamental work, with pearls and gems let in to fill up interstices" [vol. ii. p. 119]. "The four



given merely to suggest how the peculiar and varied ornamentation found on the Saivite temples, when they became lithic, might be accounted for. The change from the bambu to a more solid wood form is, I think, one of the necessary steps between the first origin and its full development into stone. This is expressed, not because the sikhara has upon it much that can be identified with wooden construction; indeed, if we assume this origin, it must be confessed that it has been lost either in a profusion of the kind of ornament indicated above, or that it has undergone a long course of changes since stone has become the building material.

Such is a rough sketch of what I propose as a theory of origin. I do not offer it as a thing proved and established. I have explained how it is that evidence on the matter is so slight, that almost nothing exists to guide us, and that consequently we have to grope in the dark; I therefore only bring the theory forward as a suggestion, or as a mere guess, to stand or to fall as further knowledge may determine.\*

Although we are without the remains that would give us the development of the sikhara, we are not quite without some data which help to confirm the theory which has been suggested. It so happens that we have a Brahmanical temple with a sikhara, which has had an origin and a development exactly the same as that I have proposed. How far this confirms the theory I must leave every one to judge for himself. There is in Bengal a peculiar type of temple, the sikhara of which is admitted to have originated in bambu and thatch [fig. 110]; it differs in detail from the sikhara of the Northern temple; but this would find an explanation so far by simply supposing that there had been no intermediate stage of solid wood construction, and that the change had taken place direct from the bambu to brick, the latter being a very common material in Bengal. Cottage roofs in that presidency are formed of four frames made of bambu and covered with thatch; as the bambus are generally small, in order to avoid

"sides of the building are covered with wonderful ornamental work; in one place figures of stringed pearls (garlands), in another figures of heavenly Rishis. The whole is surrounded by a gilded copper *âmalaka* fruit" [*ibid.* p. 118]. The Chinese pilgrims make constant reference to stupas and buildings being decorated with the "seven precious substances." These are understood to be gold, silver, lapis lazuli, crystal, cornelian, coral, and ruby. Fa-Hian describes a processional car at Khotan, which is a kind of movable temple, as having "streamers of silk and canopy curtains" upon it [*ibid.* vol. i. p. xxvi.]. A vihara at the same place:—its "beams, pillars, doors, and window-frames are all gold-plated. Moreover, there are priests' apartments, also very splendid, and elegantly adorned beyond power of description. The kings of the six countries east of the Ling give many of their most valuable jewels (to this monastery)" [*ibid.* p. xxvii.]. Semper would have found much in ancient India to support his theory of architectural decoration.—W. S.

\* It was in 1882 that this bambu theory first occurred to me, and I wrote to Fergusson about it. In his answer he said: "Your idea is certainly very ingenious, and I was at first immensely taken with it," but he at last rejected it, stating at the same time he "was far from asserting that it is wrong;" also he adds: "The bent bambu theory seems to me to come as near to an explanation of the form as any theory that has yet been suggested." The absence of evidence is what he principally complains of, and in that complaint I had to agree. Still, he seems to a certain extent to have adopted the notion, for in his *Archæology in India*, published in 1884, two years after our correspondence, he uses the following words in relation to sikharas: "assuming bambus to be used from the curved outline, which would otherwise be puzzling." In the absence of monumental evidence, Mr. Fergusson's sentence here contains perhaps the best proof of the theory that can be brought forward, which is that the curve of the sikhara is "puzzling" unless the bent bambu explanation is accepted. In December 1887 I read a Paper before the Royal Asiatic Society on "Some Suggestions of Origin in Indian Architecture," published in the *Journal of the Society*, vol. xx. N.S., pp. 49-71, where, among other "suggestions," this theory of the sikhara is given.—W. S.

weight, they bend down at the ends, and thus produce a curved form in the eaves. This is the recognised origin of the curved horizontal line which is the peculiar feature of the Bengal style of architecture; but it is not now confined to that part of India.\* The peculiar curve has been copied into other styles, particularly the later Mohammedan architecture, and there are very few buildings in any part of India in which it will not be found repeated in stone and marble. In the Mohammedan structures about Agra, Delhi, Muttra, Deeg, and Lahore the curve is increased; in some cases it is almost a semicircle, and thus becomes an arch in shape. It is one of the commonest, and it might be described as one of the most picturesque, forms of the later native styles. I have dwelt slightly upon this in passing to show the influence which roofs have had in developing architectural forms in India—an influence which, I believe, will be found in the architecture of other countries as well.



FIG. 110.—TYPE OF BENGALI TEMPLE.

This bambu sikhara is little more than a roof; but a square platform is left on the top, and on this a small model, similar in every way to the temple below, is placed—this model having also a bambu sikhara. The whole forms a tapering spire, or complete sikhara. The sketch of the Bengali temple [fig. 110] shows this peculiar arrangement of one temple surmounting the other, which will be dealt with further on. It also shows the curved line produced by the bambu, which is the important point at the moment; for if one sikhara has been developed from this material, it goes far to uphold the theory that it supplies the origin of the other as well.

There are some other points connected with the origin of the Hindu temple which may be worthy of consideration, as they also bear on the sikhara; and here again I have to confess the great uncertainty which exists, owing to the absence of what might be called direct evidence, and we can only grope by means of induction into the past. Almost every one has heard something of the celebrated Car of Jagannatha, generally misspelt “Juggernaut,” and the Rath-Yatra, or car festival—the word *Rath* meaning a car. This great ceremony, which takes place at Puri, in Orissa, is not confined to that city. There are ceremonies with cars in many parts of India, but more particularly in the South. I believe that these car festivals were more common in ancient India than they have been in later times, and that they were not confined to any local sect. Fah-Hian, in the beginning

\* I am inclined to believe that the curved roof of the Chinese house also had its origin in bambu, which is more probable than the “tent theory.”—W. S.



of the fifth century, describes a Buddhist car ceremony at Patna which he saw, as follows: "On this occasion they construct a four-wheeled car, and erect upon it a tower of five stages, composed of bamboos lashed together, the whole being supported by a centre-post resembling a large spear with three points, in height twenty-two feet and more. So it looks like a pagoda. They then cover it over with fine white linen, which they afterwards paint with gaudy colours. Having made figures of the dēvas (gods), and decorated them with gold, silver, and glass, they place them under canopies of embroidered silk. Then at the four corners (of the car) they construct niches (shrines), in which they place figures of Buddha in a sitting posture, with a Bôdhisattva standing in attendance. There are, perhaps, twenty cars thus prepared and differently decorated."\* Fah-Hian also saw another in Khotan, which was near to Yarkand, to the east of the Hindu Kush; thus showing how widely extended these particular practices were in early times. The description of the city of Oude, in the *Râmâyana*, says that, "above all, there were the sacred and resplendent chariots of the gods."† As far back as the Vedic period they were well known, and they must have been looked upon with very strange feelings, as the following account will indicate. A particular car is described as a "luminous, awful, foe-subduing, demon-slaying, cow-pen-cleaving, heaven-reaching, chariot of the ceremonial."‡ These references will at least show how numerous the cars were, and what a prominent place they occupied in the early Brahmanic ritual.

I was first led to the idea of the bambu origin of the sikhara from a photograph of one of these cars in a partly dismantled condition; the cloth and ornaments had been all taken down, but the bambu framework was still standing, giving exactly the

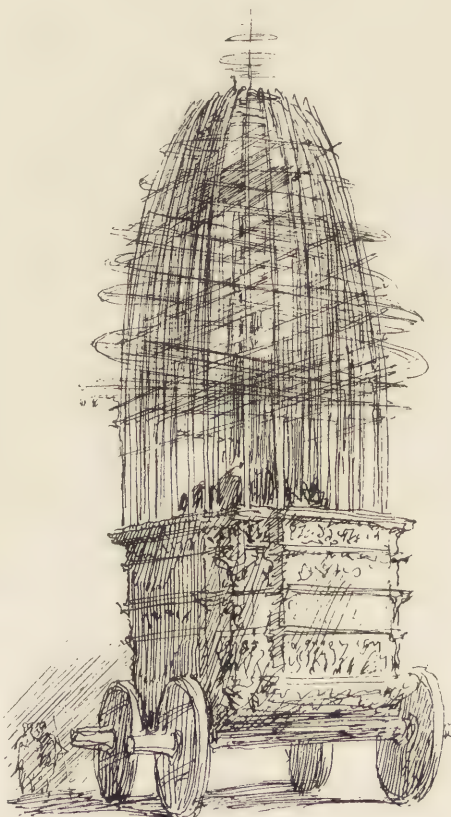


FIG. 111.—A CAR PARTLY DISMANTLED.  
(Sketched from a photograph.)

\* Beal's *Buddhist Records of the Western World*, vol. i. p. lvi. Fah-Hian's visit to India may be put about the year 400 A.D.; he remained in that country for fourteen years.—W. S.

† Fauche in his translation of the *Râmâyana*, where there is a description of the city of Ayôdhya, or Oude, mentions, among other features, that the city "il semblait encore, à ses nombreux autels pour tous les dieux, qu'elle était comme la remise où stationnaient ici-bas leurs chars animés."—W. S.

‡ *Original Sanskrit Texts on the Origin and History of the People of India* . . . translated by J. Muir, 2nd ed., 80. Lond. 1872, vol. v. p. 276.—W. S.

line of the sikhara [fig. 111]. At the same time it occurred to me that these cars might have been the origin of the Hindu temple. This idea recalled to my mind a number of recollections that gave some colour to the suggestion. These cars are simply temples on wheels, and were necessarily temples during the ceremonies. In some cases cars of this kind are yet preserved after the ceremonies, and used as temples. At Vitoba, in the Madras Presidency, there is a temple in the form of a car with wheels, which has been cut out of a mass of isolated rock.\* At Mahavellipore, near Madras, not far from the sea-shore, are several temples, all monolithic, as they are formed out of gigantic blocks of granite. The peculiar thing about them is that they are known as "raths," or cars, which is a correct translation of the word. These temples at Mahavellipore have no resemblance to cars, and why they are called by that name I have never had explained; according to the theory here suggested, the name might be a survival only of the car origin of these temples.

#### TOMB ORIGIN OF THE SAIVA TEMPLE.

I had begun to think I was progressing favourably with a possible theory, when I chanced to stumble upon a new and entirely different stratum of material bearing on the subject, and one that further consideration appeared to give a much more probable origin. The sikhara we are dealing with belongs more particularly to the Northern style of architecture, and to those temples devoted to the worship of Siva. In these temples Siva is represented by the linga, a plain stone pillar, placed on a circular pedestal called the Yoni, which represents the "female energy" of Siva; for, although Siva represents the destructive power, these symbols are understood to denote the regenerative principle of the universe. The Brahmans say there is no absolute destruction, there is only mutation—to destroy is to re-create. This is the usual explanation of the worship of Siva, and to the worship of this power the temples of that divinity are now devoted.

A natural question here arises: Did this temple with its symbolism and worship originate in the abstract speculation which this explanation gives; or is this not a later philosophical manner of expounding that which had been developed from some simple primitive rites? The latter of these queries, I think, seems to indicate by far the more likely process that has taken place. I can only give a very short account of the data that chance threw in my way, and which appear to me to confirm this.

It was at Jellalabad that I came upon the first piece of evidence in my case. There is one Hindu temple in that place, and I made friends with the chief priest. In an enclosed space of some size, which contains a number of buildings, I noticed what seemed to be a small Hindu temple with a sikhara. On pointing to it, my friend said it was the tomb of a teacher or holy person. I remember being much struck with this; but it was an isolated case, and Jellalabad is scarcely considered to be in India at the present day, so very little could be based on this solitary instance. I

\* Fergusson's *Indian and Eastern Architecture*, p. 375 (ed. 1876). In this illustration the car temple is in the distance, and the wheels are not visible, but Fergusson mentions them in the text.—W. S.



recollected that Hindu ascetics were not burned but buried, and that I had seen some graves of such individuals long ago on the Ridge at Delhi, but I could not remember what their tombs were like. I may mention that persons of this kind are buried in a sitting position, which is the contemplative attitude they assume when living. I saw what may be called the funeral of a Hindu ascetic at Benares one day. The body was tied to a flat stone, sitting as ascetics do in India, with his orange robe on; his water dish and the few articles such persons possess while living were attached to him. He was placed in a boat, which was pulled out a short distance into the Ganges, and dropped into the water. The stone acted like a sink and drew the body down, where it would rest at the bottom, the man sitting there just as he did in life.

Shortly after my return from Afghanistan I read Dr. Rajendralala Mitra's book on Buddha Gaya, in which he mentions a Math, or Hindu monastery, at that place, and says that the monks are not burned but buried. He adds: "The body is buried in a sitting posture; and in the case of mere neophytes a small circular mound of solid brickwork from three to four feet high is all that is deemed necessary for a covering for the grave. For men of greater consequence a temple is held essential; and in it, immediately over the corpse, a lingam is invariably consecrated. For Mahants the temple is large and elaborately ornamented. It would seem that even for neophytes a lingam was held essential. . . . In the way from Gaya to Buddha Gaya there are several monasteries of Hindu sannyasis, and everywhere the graves are alike." \* These details imply a regular practice existing at the present day, in which the Saiva temple is constructed as a tomb.

I have also come upon another reference which shows that it is not a new custom. From a Paper written by Mr. Rivett-Carnac, in which he describes an old temple in Kumaon, in the Himalayas, with a burial-ground attached, I give the following: "In the centre of the yard is a monolith mahadeo,† of 4½ feet in height above ground. The priest in charge of the temple held that most of the shrines were very old, and he accounted for their large number by saying that the yard was the burial-place of men of great sanctity, some of whom had been brought from great distances for interment there, and that mahadeos of an elaborate or poor class were placed over the tomb according to the means of the deceased's friends." ‡ In quite another part of India, in the south, I have another reference of the same kind. It is from an account of the Jangams, by the late C. P. Brown, a very learned Telugu scholar. He says: "Over the grave the Jangams place an image of the lingam, to which they offer worship for ten days. They then remove it, or leave it established, at pleasure." § The author had not seen any of the Jangam tombs, but he quotes a description from Lieutenant Newbold, which is worth giving, as it contains a point of importance:

\* *Buddha Gayâ, the Hermitage of Sakya Muni*, by Rajendralala Mitra, LL.D., C.I.E., Calcutta, p. 4.—W. S.

† The linga, as a symbol of Siva, is called "Mahadeo," or the Great God.—W. S.

‡ "Rough Notes on some Ancient Sculpturings on Rock in Kumaon," by Mr. Rivett-Carnac, in *The Journal of the Asiatic Society of Bengal*, 1879.—W. S.

§ "On the Creed, Customs, and Literature of the Jangams," a Paper by C. P. Brown, published in *The Asiatic Journal*, 1845, vol. iv. 3rd series, p. 176.—W. S.

"The tombs of Lingavants of rank are generally massive quadrangular structures, "raised on terraces built of stone, and simply but handsomely carved. The interior "consists generally of a square chamber, beneath which is a vault containing the real "tomb, which is also usually square. Over the head of the corpse is sometimes "placed a phallus, often ornamented daily with sweet flowers."\* This particular sect is to be found "among the Canarese, the Telugus, and the Tamils," who are Dravidians, and it is just possible that these burial customs belong to this race; and it may be mentioned at the same time that there is some reason to believe that Siva is a non-Aryan divinity.

In addition to what is given here, I have since received information from India of other places where tombs are connected with the worship of Siva, but it is unnecessary to give them, as the above is sufficient to show that the Saiva temple as a tomb is far from being infrequent, and that they are not confined to one locality, but are to be found over the length and breadth of India.

So much for the temples of Siva. I come now to the question as to whether this god has any attributes that would account for his temples having been originally tombs. In the first place, it should be remembered that he is the personification of Destruction and Death; among the emblems on his statues is a necklace of skulls. The following statement is by General Sir Alexander Cunningham, about a hill in Central India: "The name Kâlanjarâdri, or the Hill of Kâlanjara, is said to have been derived "from Siva himself, who, as Kâla, or 'Time,' causes all things to decay, and who "is therefore the destroyer of all things, and the god of death."† Sir Alexander also describes a temple at Nand-Chand, between Saugor and Rewa, dedicated to Siva, as Martangesar, or Mritangeswara, "The Lord of the dead."‡ In the Mahâbhârata, Daksha says of Siva: "He roams about in dreadful cemeteries, attended by hosts of "ghosts and sprites, like a madman, naked, with dishevelled hair, laughing, weeping, "bathed in the ashes of funeral piles, wearing a garland of dead men's [skulls], and "ornaments of human bones."§ That is the reputed character of Siva at an early period.

I will now give what seems to me to be the strongest evidence that the worship of Siva was originally connected in some manner with funereal rites. I find this in the legend as given in the *Râmâyana* of the origin of the Ganges. The sixty thousand sons of Sagara were all slain while searching for the horse that had been consecrated for the Aswamedha, or great horse-sacrifice; their bodies remained unpurified for want of sacred water, and on this account the celestial abodes were closed to them. To procure this water Bhagiratha became an ascetic, and by a long course of devotion, accompanied by the severest mortifications, the boon was granted, and the Sacred Gunga was sent down from heaven. Had the water fallen direct on the earth—so the

\* Brown's "Creed, Customs, and Literature of the Jangams," in *The Asiatic Journal*, 1845, vol. iv. 3rd series, p. 176.—W. S.

† *Archæological Survey of India. Reports*, vol. xxi. p. 22.—W. S.

‡ *Ibid.*, p. 161.—W. S.

§ Muir's *Sanskrit Texts*, vol. iv. p. 379.—W. S.



myth puts it—this world would have been destroyed ; but Siva, to avoid this catastrophe, placed his head to receive the stream, and from that it fell gently on the earth. In pictures and statues of Siva the Ganges is generally represented as coming from his head. When the water flowed over the earth to the sea the Ganges reached “ eventually into “ the infernal regions, where she purified the ashes of the sons of Sagara ” and enabled them to ascend to heaven.\* Such is the mythical story ; and here is its application. In the Saiva temples which are so plentiful along the Ganges, as well as in other parts of India, the linga, which is the only object in the small sanctum of the temple, represents Siva ; as a rule, it is a plain smooth pillar only a few inches in height, and rounded at the top ; at times, but very rarely, the head of Siva is represented on it. I have a sketch of one in which there is not only the head, but the Ganges is also represented coming from it. I only mention this to show that there is no doubt about the linga being the emblem of Siva ; the point which is important now follows. In the ceremony known as the “ Linga Pujah,” the worshipper pours Ganges water on the top of the emblem—that is the principal part of the worship. I have been in a temple where a vessel with a small hole in the bottom, containing Ganges water, was suspended over the linga, so that the water fell in drops and kept the emblem always wet.† Now it will be seen that this religious performance repeats the legend given above. The myth is the type on which the ceremony is founded ; and the myth, I suggest, has a funereal origin.

The legend and the rite point to some former period when burial of the body was the custom. I can produce evidence that such was the case. Dr. Rajendralala Mitra has published an essay on the “ Funeral Ceremony in Ancient India,” in which he gives a hymn from the *Rig-Veda* showing‡ clearly that the body was buried by the Vedic Aryans. He says : “ This continued probably from their advent in India to about the “ fourteenth or thirteenth century B.C. Then came in cremation with a subsequent “ burial of the ashes. This lasted from the fourteenth or thirteenth century B.C. to “ the early part of the Christian era, when burial was altogether dispensed with, or substituted by consignment of the ashes to a river.” § The last is the present practice, and if it has existed for nearly two thousand years it will account for the origin of the Saiva temple having been lost. Luckily we have the custom of burial in the case of ascetics as a survival of the early practice ; and I should suppose that even when burial of the body was the rule, it would only be when some “ bull among ascetics ” had achieved the fame of great sanctity that his grave would become a shrine, and a temple be erected. This supposition finds support in the Buddhist custom, for in that religion it was only the holy men who had stupas erected over their

\* Muir's *Sanskrit Texts*, vol. iv. p. 365.—W. S.

† The temple of Puttun Somnath in Gugerat, on the extreme west of India, was endowed with estates to pay men, who were kept constantly travelling to and from the Ganges, to bring water for the worship. This was the temple from which Mahmoud carried off the gates, and which our army was supposed again to have brought back to India at the end of the first Afghan War.—W. S.

‡ *Rig-Veda*, m. x. 11, 18. This hymn is given in Dr. Rajendralala Mitra's work on the *Indo-Aryans*, vol. ii. p. 122.—W. S.

§ *Ibid.*, p. 120.—W. S.

remains.\* When Buddha died cremation was the rule ; his ashes were divided and given to eight kings, who built stupas over them. Such would also be the custom among the Hindu part of the population.

These last remarks suggest the question as to why a stupa was not the rule with the Hindus as well as with the Buddhists ? Luckily I have a very important reference which bears on this point. The passage is in the *Satapatha Brâhmana*, which dates from about the third or fourth century B.C., or perhaps earlier. It is as follows :—  
 “Four-cornered. The gods and Asuras, both the offspring of Prajâpati, contended  
 “in the regions . . . (conceived, apparently, as square or angular). They, being  
 “regionless, were overcome. Hence the people who are divine construct their graves  
 “four-cornered ; whilst the Eastern people, who are akin to the Asuras, construct them  
 “round. For the gods drove the Asuras from the regions.” †

There is some obscurity about the words of this passage, but the meaning required is clear enough. The Aryans applied the word “Asuras” to the aborigines of India when they invaded that country ; the term seems to have meant something like “fiend” or “demon,” and was intended perhaps for their gods, in opposition to the Aryan divinities, which sense will suit the passage. It was the Aryan gods that were supposed to have conquered, for when new soil was acquired the sacrifice was offered from it, and this was looked upon as if the gods possessed it. The main feature, however, is that the aboriginal inhabitants made their graves round, which I take to have been the stupa, while the Aryans made them square. The words within parenthesis in the passage quoted above are by Muir, and refer, most probably, to the “four-cornered Varena,” ‡ or heaven, of the Zend-Avesta. Varena is the same as the Vedic Varuna, and both have been identified with *Oîpavós*. This might tend to show that the graves were made square, in imitation of what they believed to be the four-cornered heaven. The construction of tombs and temples after a celestial type may be traced in other parts of the world ; it is enough for my purpose here to have established the important point that square tombs existed at this early period in India.

With all this evidence here produced, I think I may at least lay claim to have made out a tolerably fair case for the proposed origin of the Saiva temple ; but as a large portion of the evidence is only what might be called theoretic, and deficient, from the circumstances of the subject, in direct proof from existing monuments, it would be rash, as yet, to assume the theory as a certainty. By bringing it forward here, it may be of use to those who may care to study the subject. But it should be stated that this theory was first given in my Paper, already alluded to, called “Some

\* Stupas were also erected for great kings previous to the time of Buddha. Before Buddha's death his disciple Ananda asked him what was to be done with his body, and he replied : “As men treat the remains of “a King of kings, so, Ananda, should they treat the remains of a Tathâgata.” After describing the process of burning in such a case, he goes on to say : “And at the four crossroads they erect a *dâgoba* to the King of “kings.” “Tathâgata” is one of the titles given to Buddha. *Mahâ-Parinibbâna-Sutta*, or *Book of the Great Decease*. Translated by Professor T. W. Rhys Davids.—W. S.

† *Satapatha Brâhmana*, xiii. 1, 5 ; quoted in Muir's *Sanskrit Texts*, vol. ii. p. 485.—W. S.

‡ The *Zend-Avesta*, the *Venîdad*, Fargard, i. 18. *Sacred Books of the East*, vol. iv. p. 9.—W. S.



"Suggestions of Origin in Indian Architecture." As yet, so far as I know, there have appeared no communications against the theory; on the contrary, one gentleman in the Bombay Civil Service has sent me further details of Saiva temples which are connected with tombs.

Before finishing with this particular form of roof—if the sikhara or spire may be so included—I should like to bring forward another example existing in India; it is found among one of the primitive races of Hindustan, and it possesses a peculiarity which may be of some interest from its bearing on one of the members of the sikhara we have just had under consideration.

#### TEMPLES OF A PRIMITIVE TRIBE IN SOUTHERN INDIA.

In the Nilagiri Mountains of the Madras Presidency are found a few primitive tribes, who still exist with customs which must have come down from a very early period. One of these tribes is that of the Todas, whose religion and temples form a most interesting study. Their principal temple—of which you shall hear further on—is a dairy; the high-priest, who is also a god, being a milkman. The cows, the dishes, and everything connected with the milk are the sacred objects in the temple. I have never been in that part of India myself, but by good chance I picked up a book about these people, called *A Phrenologist amongst the Todas*, by Colonel William E. Marshall. The title gives no idea of this charming production. The author lived among the Todas, studied their language, religion, habits, &c. Above all he studied, such as it is, their architecture; and it would be well if others would do the same when in out-of-the-way places and among the remains of old races. The work is not only full of valuable information, but much of it is told with an enjoyable humour.

The temple I am about to describe [fig. 112] is not the Dairy, but one to which the Todas give the name of "Boath." It is thus described:—"A conical thatched roof "on a circular wall of very stout planking. The wall about four cubits high. The whole "edifice some fourteen or fifteen cubits tall and six cubits in diameter. At a distance "of approximately six cubits, the temple is surrounded by a massive wall of uncut stone, "put together without cement, two cubits broad and three in height."† The interior is divided into two equal halves by a wooden partition. The doors are so small that one has to crawl on all-fours to enter. It is simply a wooden, circular structure, with a thatched roof in the shape of a tall cone. "The apex of the cone is crowned with a large "stone, placed there apparently with the object—however inadequate the conception—"of steadying the roof, or perhaps excluding the rain from that weak point."‡ This was only the author's guess. He learned that there were very sacred relics in this temple, but the priest would not allow him to enter and inspect the place. Being

\* *The Journal of the Royal Asiatic Society*, vol. xx. N.S., pp. 49-71.

† *A Phrenologist amongst the Todas, or the Study of a Primitive Tribe in Southern India*, by William E. Marshall, Lieut.-Colonel, 8o. Lond. 1873, p. 164.—W. S.

‡ *Ibid.*—W. S.

anxious to discover what the sacred objects were, Colonel Marshall, with a friend, entered the temple one night when all were asleep, and were much disappointed at finding no relics; there were only a few common articles, such as earthenware pots, and a whirl by which butter is churned. The old priest had never been found previously to have told them anything that was not correct; so, talking to him one day close to the Boath, the subject of the relics was brought up as if accidentally, and the question was put, "Do they bury them in the ground?" The answer was a negative. "Then where are they?" The priest put his hand to the side of his mouth, and in a low voice said: "Under the stone on the top of the roof."\*

The author does not seem to have discovered whether the relics were human remains or not. Still, the placing of relics of any kind in such a position has a value when



FIG. 112.—TEMPLE OF A PRIMITIVE TRIBE IN SOUTHERN INDIA.

considered in relation to what I shall now call attention to. The stupa is recognised as a development from the mound or cairn, in which, at an early period, the body was buried; in later times, when cremation was the custom, there was only a small cell or relic chamber to hold a handful or so of ashes, or perhaps a bone or two. This was all in keeping with the first idea of the monument. I do not recollect that

Fergusson has explained how he was led to suggest that the Tee on the top of the stupa was a relic shrine, "or simulated a relic casket,"† but he did so; and Dr. Burgess found a relic-chamber in the Tee of a stupa—in this particular case called a chaitya—in the Buddhist chaitya cave at Bhaja.‡ This may be said to establish the accuracy of the suggestion. Again, I have pointed out that in the sikhara of the Bengal temple, the upper part of it is a repetition of the temple below. I have not come upon any explanation of this arrangement; but, knowing what has just been stated, I naturally

\* *A Phrenologist amongst the Todas, or the Study of a Primitive Tribe in Southern India*, p. 167. My sketches [figs. 112, 115, and 116] are taken from the illustrations in this book.—W. S.

† *History of Indian and Eastern Architecture*, p. 64 (ed. 1876).—W. S.

‡ *The Cave Temples of India*. By James Fergusson and James Burgess. 8o. Lond. 1880, pp. 224–8.—W. S.



suspect that this again is another relic-holder, like the Toda example, "on the top of the roof."

On the summit of the Saiva temple sikhara there are two members, which are quite distinct from the construction of the sikhara itself. The first is a large, flat, ribbed object, not unlike a cushion; it is called the *âmalaka*. Dr. Rajendralala Mitra says it is also designated "the *Amra* or *Amrasila*, so called from its resemblance to the "emblic Myrobalan. In the *Agni Purana*, and in the *Manasara*, it is named *Udumbara*, "and likened to the *Ficus Glomerata*." \* Above this stands a vase, called a *Kalasa* or *Khamba*. What the purpose or meaning of these two members was, no one seems to know. They certainly serve no constructive purpose; and they do not convey the idea of being merely ornamental. With the relic under the large stone on the summit of the primitive Toda sikhara, as well as the other examples just referred to, I incline very much to the idea that either the *âmalaka* or the vase was originally employed to contain relics. I have had a long correspondence with a friend in India on this vase, or "water-pot," and it turns out to be a most interesting subject, but too long to be given in this Paper; all I can suggest is, that if the *kalasa* did not contain the relics, then it might probably be the vessel of water used at the funeral ceremonies; and the *âmalaka* below it would be the survival of the large stone over the relics, as in the Toda "Boath."

I have since come upon a passage in the *Sânkhayana-Grihya-Sutra* † respecting details connected with the building of a house, in which it is written:—"Let him bury "an anointed stone under the pinnacle." I take this to mean the pinnacle of the roof, for the roof is mentioned in the previous verse. It evidently points to some primitive practice of which the stone on the pinnacle of the "Boath" may be an example; and the *âmalaka* may be the same, surviving only as an architectural ornament.

This, it may be stated again, is all theoretical, and given with no assumption of certainty; still, the ventilation of the subject here may lead others to investigate, and ultimately something more reliable may be evolved.

#### CHAITYA HALLS.

I come now to another roof, which is entitled to consideration from its wide influence on the development of Indian architecture. I shall give a slight description of it, so that the puzzle which it presents as to its origin may be understood. Among the Buddhist rock temples of Western India, there is one class of them to which the title of "Chaitya Cave" has been given. Chaitya, it may be explained, is only another name for stupa or tope. Such large stupas as those at Sanchi, or Bharhut, were built in the open, and had no house over them; but there were smaller stupas which had a temple constructed over them, and these temples were at one period formed of wood. Dr. Burgess says:—"Like *Stûpa*, the word *Chaitya* is also derived from a

\* *Indo-Aryans*, vol. i. p. 57. † *Sacred Books of the East*, translated by various Oriental Scholars, and edited by F. Max Müller, vol. xxix. p. 95. The *Grihya-Sutras* contain the domestic or household rites.—W. S.

“root [*chitā*] signifying ‘a funeral pile,’ ‘heap,’ and hence means a ‘monument’ and “‘an altar,’ and in a secondary sense it is used by Jains and Buddhists to indicate “‘a temple containing a Chaitya.’ In Nepal and Tibet, and in Buddhist Sanskrit “literature, the word is applied to the model of a stūpa placed in the temples and “to which we have applied the term Dāgoba. These Chaityas or Dāgobas are an “essential feature of chapels or temples constructed solely for purposes of worship, “and which may therefore be appropriately called CHAITYA-CAVES.”\* To these temples Fergusson gives the title of Chaitya Halls. It need scarcely be stated that none of



FIG. 113.—CHAITYA HALL AT BHAJA.  
(From Fergusson's *Indian and Eastern Architecture*.)

these wooden structures now remain ; † but we know exactly what they were like, from the chaitya caves, where every detail has been copied ; everything has been reproduced in stone : they are perfect fossils, where even the minutiae of the carpenter's work has not been overlooked.

The roof may be described as something like the hull of a ship turned upside down [fig. 113]. It was constructed with ribs, curved into a form which may be accurately

\* Dr. Burgess, in *The Cave Temples of India*, p. 174.—W. S.

† There are at Sanchi a few stone pillars standing which are supposed to have been part of a chaitya hall. These are the only remains known to exist in India of a structural building of this kind ; and they show that, in some cases at least, they had been built of stone.—W. S.



enough described as a semicircular arch ; and this was overlaid with joints or rafters. In the chaitya hall, the end over the chaitya was what may be called a semi-dome ; but the other end was the shape of the roof, which had generally a horse-shoe form. Fig. 113 represents an excavated chaitya hall, the front of which has become ruined, whereby the chaitya at the far end can be seen. From the sculptures of the Sanchi stupa, as well as from others, we know the character of the houses of the same period. First there was an erection, of some height, of brick or mud, and on this was a wooden house, roofed in the same manner as the chaitya hall. The lower storey was for the cows, and there was a survival of defence in making this lower storey of a material that would not burn. The family lived in the wooden part of the house on the top. This is the type of almost all the houses represented in sculptures which date from about the period of Asoka, 250 B.C., till the beginning of the Christian era.\*

All these details are so clearly given in sculptures which have survived destruction, as well as in numerous chaitya caves, that there is no doubt about them ; but here comes the curious puzzle. As a rule, where any race had wood for their roofs, they made them flat, except in Northern climates, where rain or snow required an angle to carry off the fall of the one or the other ; still, in these cases a straight-lined roof was the result. In India, at the present day, a flat roof is the rule. It is a useful part of the dwelling : the people work on it, various articles are dried on it, and in the hot weather it forms the sleeping quarters. Up to about the beginning of our era, these same people who now make flat roofs, and who had wood as their principal building material, instead of producing the usual flat roof, constructed a barrel-roof, such as has been described. What led them to do this ? The problem becomes intensified when it is remembered that the one roof is a most simple, while the other is an elaborate, piece of construction. There must have been some reason for this ; and I have often asked myself the question as to how it was to be explained. I tried to clear it up by means of symbolism, and suggested to myself that the round vault may have been intended to represent the vault of heaven.† I had the chaitya hall only in my thoughts when this occurred ; and although it might have explained the temple, it failed when I recalled that every house had at the same time a similar roof. I felt myself thrown

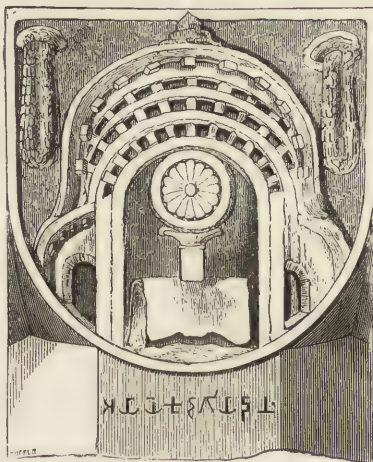


FIG. 114.—FRONT OF A CHAITYA HALL.  
(From a bas-relief at Buddha Gaya.)

\* See Mr. Simpson's Paper on "Architecture in the Himalayas," *TRANSACTIONS*, 1882-83, pp. 65-80, *Illustrn.* xxx. The front of a Chaitya Hall [fig. 114] is reproduced in that illustration, in a variety of ways, as a part of an ordinary dwelling-house.

† In the tombs of ancient Egypt, as well as in some other parts of the East, the sepulchral chamber is generally more or less formed with a vaulted roof. This point I have never seen treated as to its meaning ; for myself, I have little doubt but this had a reference to the vault of heaven.—W. S.

back on the more commonplace supposition that there must have been some very early form which had become established from long custom, and, being copied from generation to generation, had at last developed the type. The difficulty presented by this point of view was to account for a complicated form coming into existence instead of a simple one; and the farther back you propose to go in a theory of this kind, the greater the difficulty becomes. Still, although this did not seem hopeful, I think I have at last found the origin of the form, as well as the manner in which it originated, out of the very simplest materials.

I have already mentioned the work called *A Phrenologist amongst the Todas*;\* its frontispiece is a reproduction of a photograph, and on seeing it I mentally exclaimed: "Here is the origin of the chaitya cave." Perhaps the mute sentence formulated in my mind may have been a hasty conclusion; and even yet, I feel I have no right to say that in this instance the origin has been determined beyond the possibility of a doubt. All I can affirm is that it supplies quite a sufficient solution, and



FIG. 115.—THE TODA HUT, SOUTHERN INDIA.

that as yet no other method of explaining the origin has chanced to turn up. Still, it would be unwise to assume too much, and suppose that no other solution will be found in the future. In this instance again it is the bambu that seems to solve the difficulty.

The Toda house, of which the reproduction of a pen-and-ink sketch is given above [fig. 115], is constructed with bambu, which form the two sides and roof. The bambus are placed in a row as close together as possible, their ends being imbedded in the ground. The upper ends of both sides are bent inwards till they meet in the centre, where they are joined, split rattan being used to bind them, and the whole is thatched with grass. Let it be noted here that we are back again to the bambu and thatch, the primitive material for roofs in India. The result in this case is what might be called a barrel-roof, the outline of which in fig. 115 seems to be a compromise between a pointed arch and the oval Sassanian arch.† Gables

\* See pp. 243-45 *ante*.

† See figs. 7 and 13, pp. 45 and 51 *ante*.



were formed at each end with stout planking, allowing a very small doorway, described as something about 36 by 27 inches in size. In what might be called the front of the house, that is, the gable with the door, the roof projects about three feet beyond the wooden wall, forming an open verandah. There are no openings in the roof; the door seems to be the only opening into the house. The size of these houses is given as eight feet long, and the same in breadth and height. Some of the houses are made with straight-lined roofs and a ridge-pole, but the author says the round-roofed type "is that universally employed amongst the well-to-do." He also states that the straight-lined roof is more simple to make, that it is cheaper, and is ordinarily adopted by the poor people; but it is not so well fitted to endure the violence of storms or the inclemency of the weather.

Colonel Marshall accepts, and repeatedly insists, upon the primitive character of



FIG. 116.—THE TIRIËRI, OR "HOLY PLACE" OF THE TODAS.

everything belonging to the Todas; and I think no one reading his book can possibly doubt the conclusion. He tells how rigidly they adhere to every custom, and how strictly they follow all the rules which have been established among them. Their religion, with its dairy for a temple, and a "Divine Milkman" as god and priest, points in itself to a very remote period for its origin; and if the architecture is as old—and there seems no reason to doubt that it is—it will carry us quite as far back as is necessary for the theory of origin for which I contend.

The temple called *Tiriëri*,\* that is, the Dairy temple [fig. 116], not the "Boath" already described [fig. 112], is constructed exactly in the same way as the house; so

\* "*Tiriëri* = holy place. *Tira*, or *tiri*, is the recognised Dravidian corruption of the Sanskrit *shrī* = holy, "sacred." *A Phrenologist amongst the Todas*, p. 131, note.—W. S.

that we have here the temple and the house built in the same form, exactly as in the Asoka period, which is the date of the chaitya cave, whose origin we are considering.

On first reading the description of the Toda house, it occurred to me how that peculiar structure might have originated. The bambu springs up in clumps, which often grow very near to one another; a large number of the stems shoot out of the earth close together, but above they spread out; and the early man, when in a state something like that of the Australian aborigines, may have pulled down the ends, even when growing, and fixed them. This, with other branches or reeds laid over them, would produce a very useful kind of shelter; and it may have led him ultimately, when he advanced in tool-making, to cut down the bambus, and fix them in the earth, thus producing a more substantial and regular kind of a dwelling.

Ælian, in describing Taprobane, or Ceylon, says: "The houses in which the inhabitants lodge themselves are made of wood, and sometimes also of reeds."\* There need be little doubt but that the "reeds" here mentioned were bambus. Hiuen Tsiang, in describing the houses in India, says: "The earth being soft and muddy, the walls of the towns are mostly built of brick or tiles. The towers on the walls are constructed of wood or bamboo; the houses have balconies and belvederes, which are made of wood, with a coating of lime or mortar, and covered with tiles."†

The *Vayu Purāna* gives a rather elaborate account of man and his surroundings during the four *Yugas* or ages. In the *Krita yuga*, or Golden Age, houses were not required; in the *Tretā yuga*, or Silver Age, "house-like trees appeared to them; and among their fruits yielded clothes and jewels;" in the leaves of the trees honey was produced on which men fed. But at the end of this Age, as man and everything deteriorated, the *Purāna* goes on to relate that "they next constructed houses; and as formerly trees existed, formed like houses, so did they (now) begin to erect them after repeated consideration. (Some) boughs are spread out, others are bent down, others rise upwards, while others again stretch horizontally. After examining thus by reflection how the different boughs of trees branch out, they constructed in like manner the apartments (*śākhāḥ*) (of their houses): hence they are called rooms (*śālāḥ*). In this way rooms and houses derive their appellation from branches. Hence rooms are called *śālā*, and in that their character as rooms (*śālātvam*) consists. And inasmuch as the mind takes pleasure in them, and as they have gladdened (*prāsādayan*) the mind, houses, rooms, and palaces are termed respectively, *griha*, *śālā*, and *prāsāda*."‡ This account is too mythical to be considered as anything like historical, and can scarcely be brought forward as reliable evidence. Still, if the suggestions of origin given above in this Paper should turn out to be correct, the words of the *Purāna* may be accepted as a survival of the origin and mutation which really did take place. It should be mentioned that I have come upon this reference since my Paper was put in type; otherwise, it is so close in its resemblance to what is written, it might be supposed I had copied from that source.

\* *Hist. Anim.* xvi.

† Beal's *Buddhist Records of the Western World*, vol. i. p. 74.

‡ Muir's *Sanskrit Texts*, vol. i. pp. 93-95.



I find that Fergusson had seen photographs of the Toda houses, and wrote of them thus: "The only buildings in India I know of that gave the least hint of the external forms or construction of these halls" [chaitya halls], "are the huts of the Todas, on the Nilagiri Hills. In a work recently published by the late Mr. Breeks, of the Madras Civil Service, he gives two photographs of these dwellings. . . . Their roofs have precisely the same elliptical forms as the chaitya with the ridge, giving the ogee form externally, and altogether, whether by accident or design, they are miniature chaitya halls. Externally they are covered with short thatch, neatly laid on. Such forms may have existed in India two thousand years ago, and may have given rise to the peculiarities of the chaitya halls, but it is, of course, impossible to prove it."\* I may add that I have seen Mr. Breeks's book, which deals with other races besides the Todas; he gives photographs of them all, but the Todas seem to be the only race with this peculiar house. I note that what Fergusson has written about the identification corresponds very closely with what I have just penned.

The development again from the Toda house to the chaitya hall, of the Asoka period, also implies a long progress in tool-making, a progress by which the hill tribes, such as the Todas, have not been influenced. As larger houses were required, and the implements necessary for working timber came into use, these could be constructed, and more massive kinds of timber would be employed; but the form derived from the bambu having been established, it would be followed in the new material with that imitative faithfulness which is not the exclusive attribute of the uncivilised man; for when the rock-cut temples were excavated, India had reached a very high condition of culture, as her ancient literature places beyond a doubt. Even at that late period the workmen repeated every detail of the carpenter's construction when they excavated in the living rock a copy of the chaitya hall. In one of the Ajunta caves even the chamfering on the beams is repeated; and I think it was at Ellora where what had been in the wooden structure the end of a beam, with a pin to hold it in its place, was faithfully represented in the rock. It is this persistency in the imitative faculty which gives confidence in tracing an architectural type through long periods of time.

In parts of the Himalayas which I have visited, beams and planks had to be produced by an adze; the carpenter had no other implement for such work. The smoothing of a board had to be done by the same means. I mention this as it shows that carpentering has had to pass through many stages of progress. There must have been a pre-adze period, when beams and planks could not have been so easily smoothed as in the Himalayas at the time of my visit.

The influence of the roof on the development of architectural form has already been referred to; but no structural shape in India has had such a multiplicity of repetitions as the circular end of the chaitya hall. We are all familiar with the Greek pediment, with a gable and roof development, and the manner it has been

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\* *Indian and Eastern Architecture*, pp. 105-6, footnote (ed. 1876).

copied, and the various conditions under which it has been introduced; yet manifold as that is, I have an impression that it is not to be compared with this Indian gable, which has been represented over doors, has filled up blank spaces, and has been used in the ornamentation of mouldings of cornices and strings. Dravidian, or South Indian architecture, is covered with this form, and it may be traced in much of the ornamental details of the Northern architecture as well. These statements are made to show what an important form this has been in the architecture we are dealing with.

Here again I must repeat that this is but theory; though it may be added that it is the only theory that has as yet appeared on the subject. Time may perhaps disclose to us other means of explaining this origin,—so I leave it, but briefly described, to the chance of being confirmed, or not, as further knowledge may determine.

#### THE BEHAR CAVES.

Before moving to the North-West it is almost necessary to notice the Eastern, or Behar group of caves, near Buddha Gaya. The Katak caves are supposed to be the oldest, and the Behar group comes a little later,—this is somewhat doubtful, but of

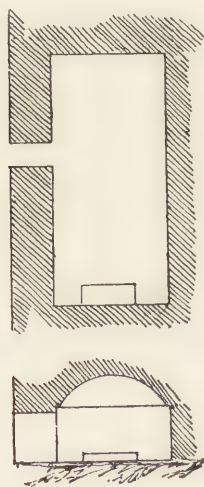


FIG. 117.

THE KARNA CHOPAR CAVE, B.C. 245.  
Plan and section.

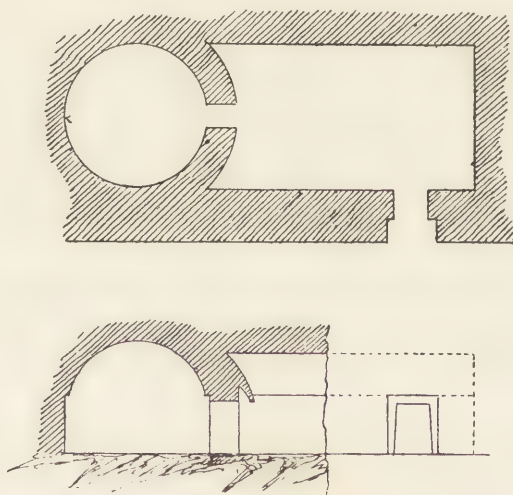


FIG. 118.

THE SUDAMA CAVE, B.C. 252.  
Plan and section.

little moment so far as the present purpose is concerned. Rajagriha, the capital of Magadha—the Holy Land of Buddhism—and Buddha Gaya, the Mecca of Buddhism, where Buddha attained to Buddhahood, are only a few miles from each other; they are situated among some hills, over which are scattered numerous remains showing the former importance of this site, and among these are a few caves. It will, perhaps, be best to describe one or two of these before comparing them with the chaitya halls.

These caves are all perfectly plain, and, with one exception, have no ornament or architectural feature beyond that of the simple lines in which they are formed. The



Son-Bhândâr Cave is a simple rectangle in plan, 34 by 17 ft.; the roof is arched with a slight point, which is 11 ft. 6 in. above the floor, and 6 ft. 9 in. where the arch springs, and where there is a drip,—which is a feature I shall have to refer to farther on. The Karna Chopâr Cave, at Barabar, is also a plain rectangular apartment, 33 ft. 6 in., by 14 ft. [fig. 117]. It has also a round roof, not pointed, but flat, rising in the centre only a little over 4 ft. from the spring. In this cave also there is a drip at the spring. The Sudâma Cave [fig. 118] presents us with another type, of which there are two other examples at Barabar—the Lomas Rishi and the Viswa Mitra Caves. In all of these there is a door at one end of the rectangular apartment leading to a circular room. In each case the roofs are round with the drip, and the circular room is domed, with the usual drip at the spring of the dome. The supposition is that the circular apartment at the end had in it either a stupa, or a figure of

Buddha. If it was a stupa, then these were the chaitya halls of the eastern part of India. Assuming this to be the case, some curious problems are presented to us on the points of resemblance between these comparatively small and simple caves and the magnificent chaitya halls of Western India. As we are only considering the subject of roofs, it will

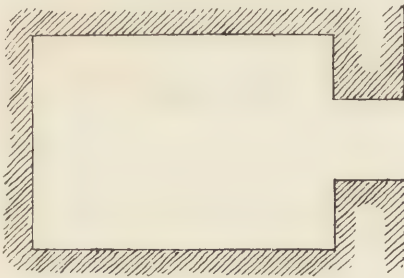


FIG. 119.—THE SITAMARHI CAVE.  
Plan and section.

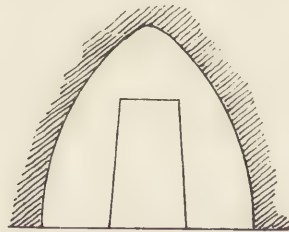


FIG. 120.—THE SITAMARHI CAVE.  
Transverse section.

not be necessary to enter into this. The probability is that the roofs of these Behar caves are also developments from the Toda hut, and not copies of a constructive arch; at least, we know as yet of no constructive arch existing in ancient India from which roofs of such a form could be derived.

Not far from Buddha Gaya there is a very simple cave known as the Sitamarhi Cave, of which I give a plan and two sections [figs. 119, 120], so that they may be compared with those in Afghanistan.

It appears to me as necessary that this very slight account of the Behar caves should be given before dealing with the caves of Afghanistan. My object will now be to try and trace these forms through Afghanistan to Central Asia and Khorassan, where we find constructive arches, domes, and barrel-roofs; and thus come within a measurable distance of the region covered by Mr. Spiers's Paper on Sassanian Architecture

[see pp. 37–68 *ante*]. Persia only will thus remain untouched ; but I have luckily some new material from Central Asia, for which we are indebted to the late Afghan Boundary Commission ; and some of which seems to me very important, though the want of dates leaves much to be desired, and prevents the full signification of it from being realised. This will be laid before you, but for the present I must take up the caves in Afghanistan on the side towards India.

#### CAVES IN AFGHANISTAN.

Previous to the Afghan war of 1878–9, our knowledge of Indian architecture extended only to the mouth of the Khyber Pass. The very small drawings of topes made by Masson,\* from which no details could be made out, were the only guides we had to the Buddhist remains of that country. Although our troops were some years in Afghanistan in the first war, yet no one seems to have noticed the many ruined topes, nor the multitudes of caves, which are such a marked feature of the kingdom of Kabul—at least, nothing that I know of was published. Being aware of this, I felt, when entering the Khyber in the November of 1878 with our troops, a sense of delight that there was a new and an unexplored field before me ; and one in which I chanced to have a peculiar interest. I had no doubt of the value of any new material I could bring home, so I was prepared to keep my eyes open and my sketch-book in readiness. I now propose to bring before you, as a part of my present subject, the old Buddhist caves I saw there.†

The number of these caves in Afghanistan is very large, and they are found in extensive groups in different localities. The numerous caves at Bamian have been



FIG. 121.  
CAVE IN THE JELLALABAD VALLEY.  
A, recess.

mentioned by every traveller who has passed them, and rough sketches of the colossal statues at that place have been published, but no one took the trouble to make notes of the caves. I shall, however, first describe the caves in the Jellalabad Valley, for they were the first I became acquainted with. The Afghans call them at the present day *samuches*, pronounced *s'muches*. There are numerous tribes that change their ground in summer and winter. They go to the higher

regions with their flocks in the summer ; but as it was winter when I was in the Jellalabad Valley, these people, called *Koochis*, were there with their flocks, utilising the caves for their winter quarters. This has caused the caves to suffer much damage,

\* Illustrations and a description of these were published in the *Ariana Antiqua*, by Professor H. H. Wilson, 4o. Lond. 1841, pp. 55–118. Mr. Masson was in Afghanistan for some years, before and at least during the beginning of the first Afghan war. He did good work while there in collecting coins, Greek and Indo-Scythian, which formed the nucleus of the grand collection of these coins in the museum of the India Office.—W. S.

† I read a Paper before the Royal Asiatic Society on "The Buddhist Caves of Afghanistan," published in the *Journal* of that Society, vol. xiv. N.S., pp. 319–331.—W. S.



as originally they were plastered, and there are still remains—but only the merest fragments—of paintings. The Koochis, with their fires, and by keeping their animals in the caves, have contributed largely to this result.

There is one group of caves between the Khyber and the Jellalabad Valley at Chicknoor, on the Kabul River opposite Basawul. The people told us that these caves were all inhabited, and extended far into the mountain; and that one reached all the way to Kashmir. The party of officers who crossed the river with me to visit the caves took the precaution to carry lanterns, as well as revolvers, so that such wonderful excavations might be thoroughly explored; but no cave was found beyond the dimensions stated below. Owing to the character of the rock they were in rather a decayed condition, and afforded very little information as to details. The number of caves in the Jellalabad Valley is so great that, in spite of the Koochis, many are still remaining almost intact, or at least in such a state that their details are sufficiently distinct. These details are very few, for, with only one or two exceptions, they are nearly all of the same form, which might be described as merely an arched recess. They seem to have been all open in front—rectangular in plan—extending about 20 or 30 ft. into the rock, about 10 or 12 ft. wide, and about the same in height [fig. 121]. Most of the caves had a rudely-cut recess in them, as represented in the diagram [A, fig. 121]. It was about 6 ft. in length, and might have been merely a place to sleep in; but these recesses were so roughly dug out that they did not seem to belong to the original plan. Occasionally two of these caves had an excavated communication joining them at their inner ends.

The rule seemed to be that the roof was roughly circular [fig. 122], but at times the upper part was flattened—that is, at the spring it began with a curve, but after a foot or so, it became a very flat curve [fig. 123]; these were, however, the exception. A marked feature was a drip at the spring of the arch. In most cases the sides of the cave were perpendicular, but at Hada there was one cave in very good order, having its sides sloping inwards towards the roof [fig. 124]. This is a feature of the Indian caves I have not touched upon, but in the Lomas Rishi Cave, as well as in some others, the jambs of the door slope inwards towards the top; and in some of the older caves of Western India—as in the chaitya hall at Bhaja [fig. 113]—this feature is also found. This, with the arched roof and the drip being the same as the Behar caves, led me to the conclusion that these latter

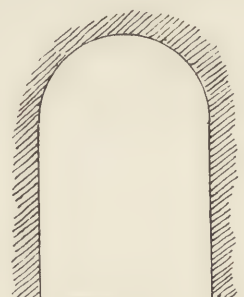


FIG. 122.—SECTION.

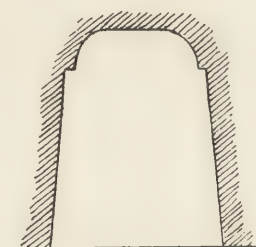


FIG. 123.—SECTION.

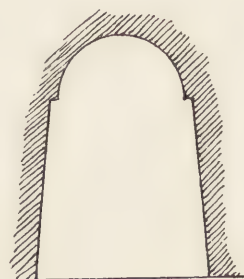


FIG. 124.—SECTION.

were the models, and those of Afghanistan the copies. This is a long way for the model to be carried, but, so far as we know, there are no caves between. In my Paper on the Buddhist Architecture of the Jellalabad Valley \* it was shown that some of the marked features of the Buddhist style had been carried across the Indus into Afghanistan,† and were combined with the details of the Greek style, which had come through Bactria. If this were the case, it takes away all improbability in the supposition

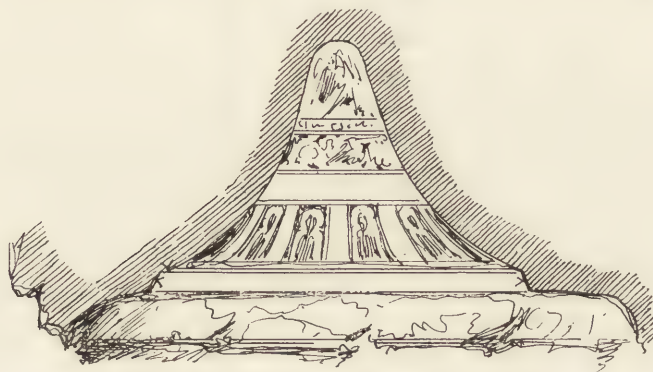


FIG. 125.—DOME OF CAVE NEAR JELLALABAD.

particularly as they were made by the great king Asoka—and carried the idea back with them to their own country. This was the conclusion I formed at the time, and, although I have now a more extended knowledge of the caves of Afghanistan, I see no substantial reason as yet for rejecting it.

At Hada, near Jellalabad, there were one or two small square cavés with domes [figs. 125 and 126]; these either contained figures of Buddha, or small stupas. In one



FIG. 126.—DOME OF CAVE NEAR JELLALABAD.

are surmounted by a pyramidal form made of wood, and I have sketches of a conical shaped roof or dome surmounting temples in the Sutlej Valley; I suspect, therefore, that the peculiar dome in the Jellalabad Valley is a repetition of this form. If my

tion that the details of the caves had also been transported. Buddha Gaya was a famed place of pilgrimage—it is so still: Buddhist pilgrims to this day coming to it from all parts,—and it is easy to suppose that pilgrims from Afghanistan would be impressed with the caves they saw at that place—

the dome—if it may be called so—was conical, or tent-shaped [fig. 125]: that is, the line curved very slightly inwards. This was probably a local feature, as I know of no such form in the plains of India; but in the Himalayas, sikharas

\* TRANSACTIONS, 1879–80, pp. 37–64.

† Hiuen Tsiang, the Chinese pilgrim, mentions a stupa near Balkh, and gives an interesting legend about it, how two merchants received some hair and nail-cuttings, as relics, from Buddha, at the Deer-park, near Benares. The merchants inquired in what manner the relics were to be venerated, when Buddha explained to them how to construct a stupa. This they did on their return to Balkh, and the pilgrim says that it was “the very first *Stupa* of the Buddhist religion erected.” Beal’s *Buddhist Records*, vol. i. p. 48. Here is good evidence that architectural forms had been transmitted over the very area under consideration.—W. S.



search of origin has been correct, it will be seen that, as yet, what is known as a constructive arch, barrel-roof, or dome, has not been reached. I have only been dealing with forms which I have supposed can be traced back to the primitive Toda hut. I have, however, a few more details from Afghanistan to give, some of which are probably derived from the same source, before I produce caves with domes, about which there will be no doubt of their origin having been from constructive models.

I shall now move to the caves on the other side of Afghanistan, that is, to the Turkestan or Central Asian frontier. When I visited this region in 1884-85, I was anxious to find any traces which might indicate how far westward into Persia Buddhism had spread.\* It was not till I reached the Heri Rud, the river which divides Persia on the east from Afghanistan, that I found what I believe to have been Buddhist caves. This was at a place called Dowlutabad, about ten miles south of Sarrakhs; upon the eastern or right bank of the river, which is now Russian territory, I saw holes in a cliff, and managed to cross the river on my horse, but all means of climbing up to them had worn away, and I was left in doubt about their character. That they were caves, and excavated, was evident enough, but it was only after other caves were discovered in the same region that I came to the conclusion that they were, in all probability, Buddhist. Assuming them to be so, they are the latest monumental evidence of the extension of Buddhism westward in that part of the world. I am speaking here of westward towards Persia. I am aware that there are Buddhists on the north-western shore of the Caspian, which is far west of the Heri Rud.

The Afghan Boundary Commission wintered at Bala Murghab, on the Murghab River; while there a number of caves were discovered, and in two cases plans and sections were made. Opposite our camp, on the left bank, there are two caves, high up on a steep cliff. I visited these with Major Talbot, R.E.; he managed to scramble up, and measured them. They are very rude—one was 45 ft. long, and the other 30 ft.; 7 ft. wide, and 7 ft. high, with a communicating passage near the entrance.† No part of the sides can be described as perpendicular, the curve of the roof springing from the ground; it cannot be called a pointed arch, but it is very near it [fig. 127]. Compare the section of it with that of the Sitamarhi Cave [fig. 120]. One detail, as it refers to the roof, ought not to be omitted; it is that along the centre of the roof there are at intervals small holes—three or four occurring in the larger cave. I can offer no explanation of them.

One of our officers, Major F. de Laessœ, was stationed for a short time at Penjdeh,

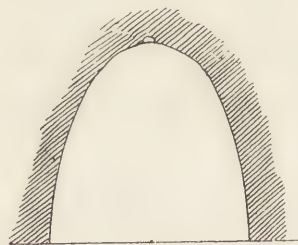


FIG. 127.—SECTION OF CAVE AT BALA MURGHAB.

\* When Buddhism reached Central Asia it seems to have extended itself rapidly to the east, as far as China—that is, through a Turanian population. On the west, where there was an Aryan race, it made little or no progress. The fact is instructive as bearing on the ethnical affinities of Buddhism. Hiuen Tsiang states that there were two or three sanghârâmas, or monasteries, in Persia.—W. S.

† For plan and section, as well as other details, see *The Journal of the Royal Asiatic Society*, vol. xviii. p. 96. They are known as the Yaki Deshik Caves.—W. S.

on the Murghab; and while there he was lucky enough to discover a most interesting group of caves. In this case there is a long vaulted passage, 9 ft. wide and the same in height, which extends into the rock for a distance of 150 ft. On each side of this tunnel numerous caves branch off; the whole forming quite an underground town. It was no doubt a large and important Buddhist monastery. Major de Laessoë made a plan and a section of the great passage, and he says that the section of all the caves was similar; the sides are perpendicular, with a drip at the spring of the arch, which he describes as "pointed." He shows in the section what may perhaps be a groove at the point, which he does not explain, except it be in the following words:—

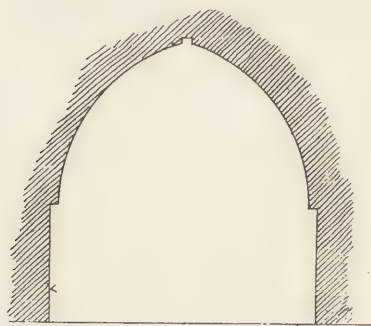


FIG. 128.—SECTION OF CAVE  
AT PENJDEH.

"The beginning and the top of all vaults are marked by straight lines 2 inches deep, and the same in breadth."\* By "the beginning" of the

vault, I take it he means the drip; and "the top" may mean the point of the arch. Although I cannot offer any explanation of this groove—it is as puzzling as the holes mentioned above in the Bala Murghab caves—I call attention to it, because we never know how important the smallest bit of detail may become when origins have to be traced back [fig. 128].

Other caves were reported as existing in the locality, but I have no details of them. The two sections of those that were surveyed and drawn are, I think, sufficient to show the resemblance I wish to be noted as existing between them and those of the Jellalabad Valley.

It is a curious feature of this part of my Paper that from the Toda Hut in the south of India I have been tracing fragments of form only in rock-cut caves; it has been what might be called quite an underground search for knowledge. This has been necessary from the early architecture of India having been almost wholly of a wooden construction, and we only know its forms from the copies of them that had been cut in the rock. In Central Asia, again, sun-dried brick or mud was the building material, and in that region nothing but mounds of earth remain now to tell where cities have stood. So here, also in Central Asia, the same conditions are confronting us. The buildings of the past have vanished, and it is only in caves that we can find vestiges of the architecture which once existed.

#### CAVES AT HAIBAK, CENTRAL ASIA.

I am indebted to Major the Hon. G. M. Talbot, R.E., who was one of the Survey Department with the Afghan Boundary Commission, for plans and sections of a series

\* For plan and section, as well as other details, see *The Journal of the Royal Asiatic Society*, vol. xviii. N.S., pp. 93-4.



of caves,\* which I think will be considered of great value as bearing on the history of the dome. Major Talbot made an expedition for surveying purposes through the mountains eastward to Bamian, from which he went north to Haibak and Balkh. There are a great many caves in this locality; one place is called "Hazarsam," or the thousand samuches or caves, which will give some idea of the extent of the several groups. It was at Haibak—on the road going north from Bamian to the Oxus, and a little south of Khulm—where he found a group known as "the Stables of Rustam," plans and sections of which are given in *Illustn. vi*. There is a series of arches which would answer very well for keeping horses in, but I have no doubt that it was a Buddhist monastery, although it must be confessed it is very different in its arrangement from any monastery that we know. Bamian, with its colossal figures cut in the rock, and its caves, we know for certain were Buddhist; and as Haibak is not far from it, we may assume that it was also Buddhist, and that all the caves in the same neighbourhood had their origin when Buddhism flourished there. Here again I shall restrict myself to the roofs.

The principal cave in group No. 3 † is the most important; it is square in plan, with a dome. It may have contained a stupa in the centre, or a figure of Buddha; I should incline myself to the idea that it was a stupa, and that there were statues in the four niches—which would be in keeping with what we know of the stupas at Sanchi and Bharhut. In the cave which appears to form an ante-room to the shrine, the drip at the spring of the roof is distinctly represented in the section; this drip seems to be a recognised form in nearly all the caves of Afghanistan.

The dome over the square cave introduces us to an entirely new form in these caves. It is evidently excavated in the rock in imitation of a structural dome. None of the domes in the caves which have been previously dealt with in this Paper bore any evidence of a structural origin. With the exception of a few domes belonging to Jain temples, which were formed by horizontal courses, and not on the arch principle, we have no constructed domes in India till the Mohammedan period. So it may be accepted as a point beyond all doubt that this dome did not come from India. That it is a copy of a built form is manifest from the pendentives. The small pillars under the spring of the dome—a very peculiar piece of detail—are further evidence of the constructive character of the original model. The dome itself is not pointed, but is round at the top, thus giving us the same form as in the Sassanian architecture. In this instance, in group No. 3, † the dome is not exactly so high as in the Sassanian examples; but in group No. 1 † it is higher; and in group No. 4 † it rises to such a height that it almost repeats the form of the great arch at Ctesiphon [*fig. 13, p. 51 ante*]. That this Central Asian dome belongs to a style of architecture closely allied to the

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\* Major Talbot allowed me, on his return from Central Asia, to make copies of his drawings. He at the same time warned me that all the officers had received strict orders not to publish any information they had collected in connection with the Commission. A few months ago I applied at the India Office for permission to make use of the drawings, and I am indebted to the kindness of General Sir Peter Lumsden for being allowed to reproduce them. I have also Major Talbot's permission.—W. S.

† See *Illustn. vi*, pp. 260–261.

Sassanian, is made all but certain from the pendentives. In both cases this constructive part of the dome is exactly the same, the only difference being in the number of concentric arches ;—three is the rule in the Haibak caves, while in the palace at Firouzabad there are at least six or seven. The small pillars, or pilasters, present another difference, showing, what we might expect, that there would be variations in detail peculiar to each locality.

An important point here presents itself—that is, as to whether the domes of these Haibak caves are exceptional or not. Major Talbot's drawings have the merit of being the only material we as yet possess of these architectural remains. As already explained, owing to the building material of that part of the world, no contemporary structures now exist ; so it is only in rock-cut caves that there is any chance of details



FIG. 129.—PENDENTIVE IN THE CAVES AT BAMIAN.  
(From a sketch by Major Talbot, R.E.)

being found. Luckily, Major Talbot visited Bamian—which might be described as “a city of caverns ;” but he did not make drawings of them, except the doorways which I will describe presently. In a letter to myself he gives the following description : “Most of the caves “in good order are now inhabited, so I could “not visit them ; of those I did visit most of

“them had domed roofs, the floor being square. The conversion of the square into “a circle, preparatory to the springing of the dome, is effected or rather indicated in “the manner used in the present day with *kacha* \* bricks, that is, by a succession of “arches at the corners. Looking at the corner from the centre of the cave it appears “thus.”† With this was a very slight sketch showing a pendentive of the same form as those in the Haibak caves. In this case five concentric arches appear [fig. 129].

#### CAVES AT BAMIAN, CENTRAL ASIA.

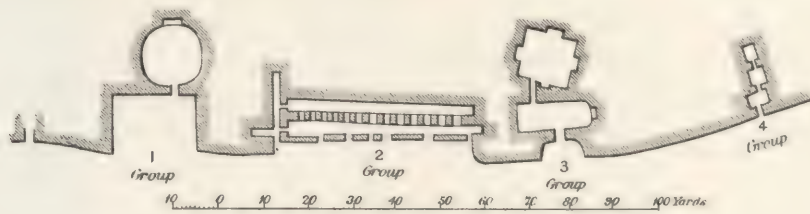
When Major Talbot was at Bamian, he had some difficulty in seeing the inside of the caves, owing to most of them being inhabited ; but he was able to make drawings of the exteriors, and as these show the doorways, they present us with some of the forms peculiar to the locality. As some of these are arched, or at least have curved forms,

\* *Kacha* is a very common Hindustani word in India. It means “raw” or “uncooked,” and in the case of bricks, “sun-dried.” Fire-burned bricks are called *pucka* or “cooked.”—W. S.

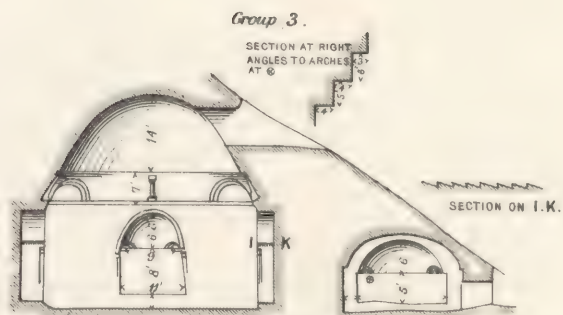
† This letter has been published in *The Journal of the Royal Asiatic Society*, vol. xviii. N.S., pp. 329–34. With it is also published a letter from Major Maitland, who accompanied Major Talbot in the expedition, and from it I here quote some further details which are of interest :—“The caves, though so numerous, are not large. “By far the greater portion of them are chambers twelve to fourteen feet square, with domed roofs. I think as a “rule several chambers open into each other, and have a wide portico in front by which light is admitted to “the doorways. These have generally round arches. There are certainly no pointed arches anywhere, but some “of the openings may be square-headed. The domes are set on the four-headed chambers in a remarkable “manner, the square being reduced to an octagon by cornices springing by tiers from the angles in unmis- “takable imitation of brick-work. It is a very curious fact that at Kandahar domes are to this day commonly “built on brick-built square chambers in exactly the same fashion.” *Ibid.* p. 349. The last statement in this quotation I take to be the same as Major Talbot's, where he refers to the use of *kacha*, or sun-dried bricks. Correct drawings of these domes with their pendentives of the present day would be valuable, as they might perhaps throw light on the older forms.—W. S.







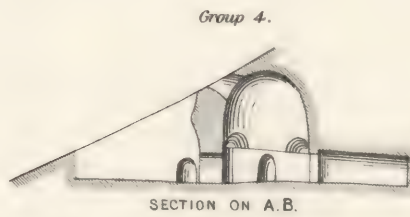
GENERAL PLAN OF THE CAVES.



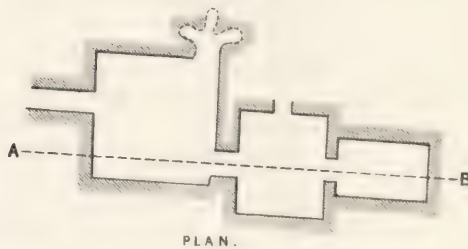
SECTION AND ELEVATION ON G.H.

See Plan.

from drawings by Major Moilland.

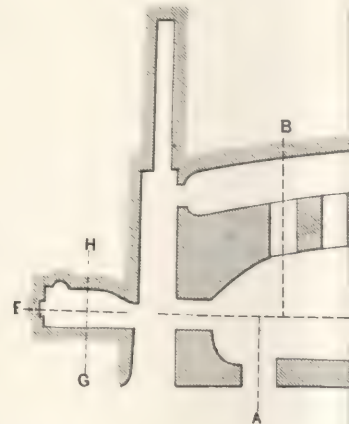
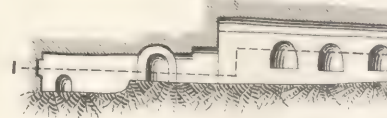


SECTION ON A.B.

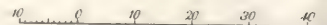


PLAN.

Surveyed by Major the Hon. G. M. Talbot, R.E.



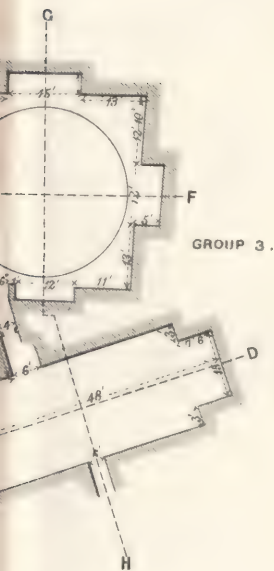
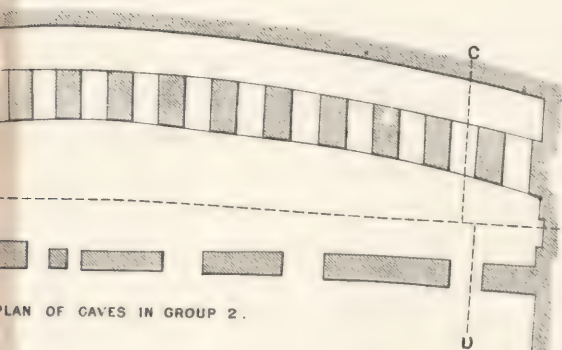
PLAN OF







SECTION ON E.F.  
See Plan below



0 20 40 60 80 100 Feet

CENTRAL ASIA.



SECTION ON G.H.

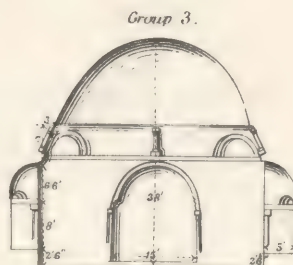


SECTION ON C.D.

See Plan of Caves in Group 2.



SECTION ON A.B.



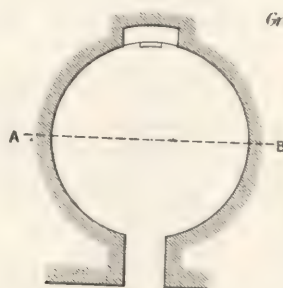
SECTION AND ELEVATION ON E.F.



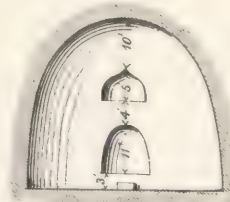
SECTION AND ELEVATION ON C.D.

See Plan

From drawings by Major Maillard.



PLAN.



SECTION ON A.B.



PATTERN ON CEILING IN GROUP 1.

From a drawing by Major Maillard.





they may be worth giving here as an addition to this Paper. Architectural details from this part of the world are scarce, and we have already seen how valuable the slight sketch—with only a few lines—of the pendentive from one of the Bamian caves has proved, as it became evidence that the domes of the Haibak caves were not exceptional; so it is just possible that any one of the outlines of these doorways may have a value, and, as a connecting link, become evidence in some point of importance.

Nos. 1, 2, 3, 4, and 5 [fig. 131] are variations of one form, and to understand it properly I must refer to a drawing given in my previous Paper on the Buddhist Architecture of the Jellalabad Valley.\* The form is there described as being new to us in Indian architecture [fig. 130]. It is evidently the representation of a doorway, but in Afghanistan at the Buddhist period it had become merely a decorative feature, and was used much in the same way as men introduce blank windows with pediments to relieve any large flat space. In the outline given in that Paper it will be seen that it had a wooden origin, and it either belonged at first to a wooden manner of construction, or the sloping jambs had their starting point in the sloping walls which were peculiar to mud building. In correspondence which followed my Paper on "Mud Architecture," Mr. Spiers pointed out that the sloping walls of Egyptian Pylons were most probably merely

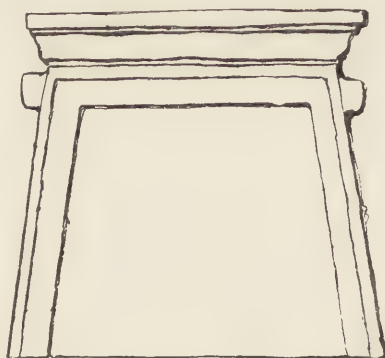


FIG. 130.—SKETCH OF A DOORWAY AT JELLALABAD.

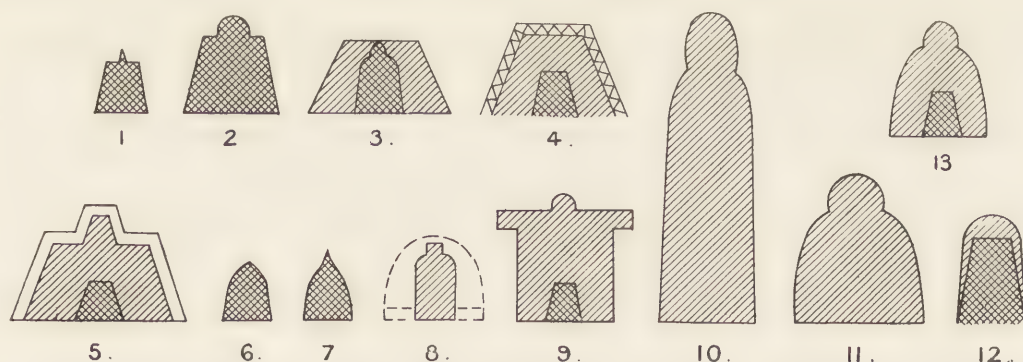


FIG. 131.—DOORWAYS TO THE CAVES AT BAMIAN.

(From sketches by Major Talbot, R.E.)

copies of mud predecessors. To this it might be added that the sloping jambs which are found in so many early styles of building had in all likelihood the same origin; there is no apparent reason why walls or jambs should have a slope in a purely wooden construction. We have instances of these sloping jambs in India, in the

\* TRANSACTIONS, 1879-80, pl. vi., fig. 3.

† TRANSACTIONS, Vol. III. N.S., pp. 57-80.

Lomas Rishi, and Sitamarhi caves; but the great slope of most of the Bamian examples seems more nearly allied to the Tibetan doorways, such as that at the monastery of Tassiding; \* but I take it to have been a form that must have been common in Afghanistan at an early period,—otherwise it would be difficult to account for its prominence as a decorative feature in the Buddhist architecture of that country.

Nos. 6, 7, and 8 [fig. 131] are what I take to be variations of form derived originally from the Behar caves; but in this I confess to some hesitancy about the conclusion.

No. 9 is like a shirt spread out to dry; it seems to be exceptional, and I will not hazard an opinion about it.

Nos. 10, 11, and 13 [fig. 131] are probably variations of the trefoiled arch which we are familiar with in Kashmir, and which may be seen in the temples of Martand, Pandrethan, and Payech; it is also found in the Punjab, and the form appears with much frequency in the sculptures of the Peshawur Valley. Fergusson says very truly that in our present state of knowledge it cannot be accounted for “by any “constructive necessity, nor traced to any foreign style from which it could have been

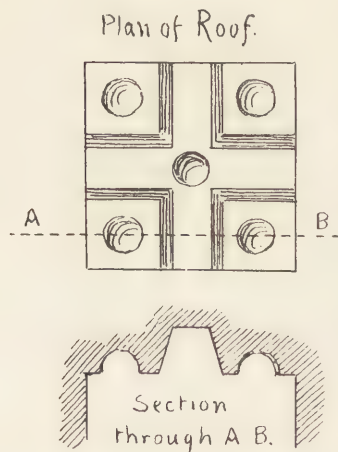


FIG. 132.—CAVES AT BAMIAN.  
(Diagrams by Major Maitland.)

“copied.”† The only suggestion of origin he can give is that “it is derived from the façades of the chaitya “halls of the Buddhists.”‡ As this form is not visible to the eye, and can only be seen in a section, it is rather doubtful as a solution; indeed, Fergusson himself does not speak of it with much confidence, and alludes to it only as an “impression.” That the central arch of this trefoiled form is derived from the circular roof of the Buddhist chaitya hall, I have no doubt, and it seems to me to supply a strong confirmation to the suggestion in my Paper, that the roofs of the Afghanistan caves were copied in imitation of Indian examples.

No. 12 [fig. 131] shows a circular arch and the sloping jambs.

The last roof from Bamian I have to produce seems to be the most difficult puzzle of all. Its solution may be fairly described as a conundrum in roofs. I quite give it up, and can pretend to no explanation. Major Talbot states that its dimensions are 20 ft. by 16, and says it is “somewhat hard to draw.” He made plans and sections of it; but Major Maitland

\* See Fergusson's *Indian and Eastern Architecture*, p. 313 (ed. 1876). In the part of Tibet I visited mud was the building material; it is a rainless, and consequently a treeless country, where wood is scarce; and I am under the impression that sloping walls and sloping jambs will be found to exist more or less over the whole region.—W. S.

† *Indian and Eastern Architecture*, p. 285 (ed. 1876).

‡ *Ibid.* Fergusson refers to wood-cuts No. 46 [fig. 113, p. 246 ante] and No. 58 [p. 123 of his book] to illustrate this.—W. S.



managed to make a sketch of the interior, which I append, as it conveys a very good notion of the peculiarities of form in this case [fig. 133]. I have also given the small plan and section of the roof [fig. 132] which accompanied the sketch. There are large blocks left in each of the four corners, on the lower surface of which a hemispherical dome has been hollowed out; and a similar dome is also represented in the centre of the roof  $1\frac{1}{2}$  ft. in diameter—so that the roof may be said to have five domes, if the word may be rightly applied to such diminutive hollows. I can only point out that the doorway No. 5 [fig. 131] has an outline showing almost the same form as that given in the section of this roof; and that Nos. 1, 2, 3, 8, 9, as well as 10, 11, and 12 [fig. 131] may only be variations of the same. In the section of the Penjdeh cave [fig. 128] there is at the apex of the roof a space, described by Major de Laessoë as “2 inches deep, and the same in breadth, which may possibly be a diminutive of the Bamian form.”

It may be of some interest to add—although not connected with the subject of the Paper—that Major Talbot measured the colossal figures of Buddha at Bamian with the

theodolite, and found the large one to be 173 feet high, and the second 120 feet. Previous to this measurement we had had only the rough guesses of travellers who chanced to visit the spot; and the height of the statues turns out to be much greater than the highest estimates ever given.\*

The description of the domes at Bamian given by Major Talbot and Major Maitland is, I think, conclusive proof that the Haibak domes are not excep-

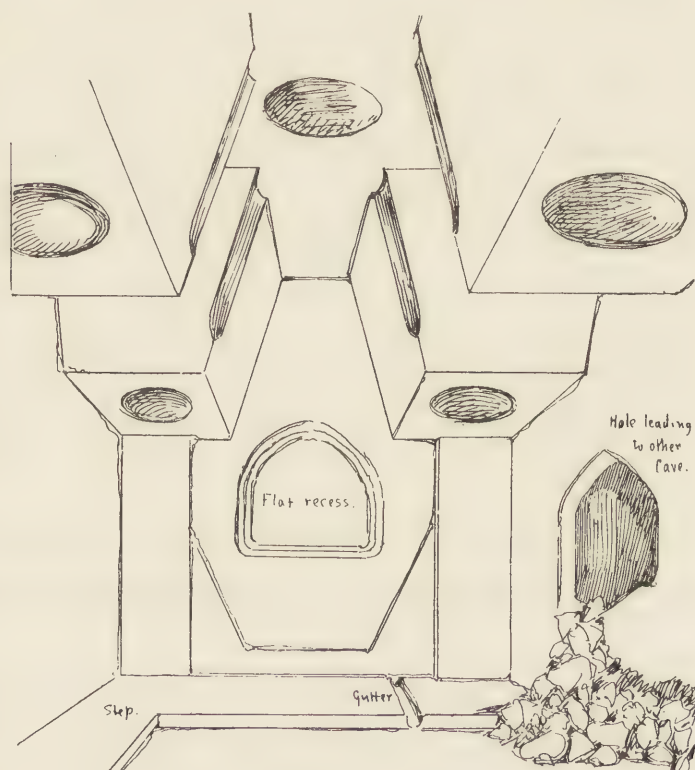


FIG. 133.—CAVES AT BAMIAN.  
(From a sketch by Major Maitland.)

\* Major Talbot's letters and drawings, along with those of Major Maitland, with notes added by myself, and an introduction by the late Sir Henry Yule, were published in *The Journal of the Royal Asiatic Society*, vol. xviii. N.S. The account of the Yaki Deshik caves at Penjdeh on the Murghab, by Major de Laessoë, will be found in the same volume of that *Journal*.—W. S.

tional; and that, if the caves in the locality were visited and drawn, this structural type would be found among them all. It may be explained here that Bamian and Haibak are on the north of the watershed of the Koh-i-Baba range, which is a western continuation of the Hindu Kush, and that they are within the basin of that large area known as Central Asia, in which, at no great distance northwards, are the celebrated cities of Bokhara and Samarkand. It seems to me reasonable to suppose that this would be the form of dome common to the whole region.

If this conclusion is correct we must extend still farther the geographical area over which this dome was constructed. Its similarity to the Sassanian domes is so great, that the two may be classed as belonging to the same, or at least to a closely allied, style; and it may be assumed that this dome was at some particular date not only common to Central Asia, but to the countries westward, including Khorassan, the north of Persia, and as far as the banks of the Tigris and the Euphrates. If this be accepted, it will vastly increase the importance of that style of architecture which has hitherto been known under the term Sassanian, and which is only represented as yet by a very few remains of old buildings, all found within a comparatively limited space. That space also will now be widened out so as to include all the countries between Samarkand in the east, and Rabbath Ammon, in Moab, on the west.

There is one point which ought to be noticed: it is the absence of the slightest touch of Greek influence in any of the caves. Haibak and Bamian were in Bactria; and Balkh, the capital of the Power that Alexander founded, was close to Haibak. Greek artists and architects must have come to Balkh, otherwise we cannot explain the Greek influence which is visible in the sculptures and in the stupas of which the remains are still found in Afghanistan and the Punjab.\* This would tend to show that there existed a typical form or forms which were more or less followed in the caves.

The question as to whether this dome of the Haibak caves originated in the Euphrates Valley or in Central Asia is a point that must be left to the future. Unfortunately we have no dates to guide us in relation to the Haibak caves, or of those at Bamian. No inscriptions were visible in any of the caves of the Jellalabad Valley, and, from the number of caves I saw, I cannot say there is much hope that data of this kind is likely to be found. An approximate period only, and that a very wide one, is all that can as yet be arrived at. At the conclusion of the third Buddhist Synod, which was held at Pataliputra—the present Patna—in the year 241 B.C., missionaries were sent out to distant regions: some to the Himalayas; some to Kashmir and Gandhara—this last was the country about Peshawur; others, again, were sent to the *Yona* or *Yavana* country, which is supposed to have been Afghanistan.†

\* The coins of the period also bear evidence that Greek artists must have been there.—W. S.

† Professor Rhys Davids, who is a high authority on Buddhist literature, mentions the same statement as occurring in the twelfth chapter of the *Mahavansa*, giving the name of the country as “Yonaloka,” and translating it “Bactria.” The words *Yona* and *Yavana* were at first understood by Indian scholars to apply to the Greeks; undoubtedly the terms were used in relation to that people, but it is now accepted that they applied equally to other races in the north-west of India.—W. S.



At the beginning of the first century of our era, Kanishka, one of the Indo-Scythian kings, became the ruler; he was the Asoka or Constantine of that part of the world, and supported the Buddhists in every way. Not till this monarch came into power need we suppose that the followers of the new faith began to build and excavate in the rocks.\* It was in the year 630 A.D. that Hiuen Tsiang, the Chinese pilgrim, passed Bamian on his way to India. He describes the great figures of Buddha, but, strange to say, does not mention the caves; but they must have existed when he was there, for there was not sufficient time after his visit for them to have been made before the Arab invasion, which brought Mohammedanism to Central Asia. In 666, only thirty-six years after Hiuen Tsiang's time, the Arabs under Rebi Ibn ul Harith, invaded Khorassan and shortly afterwards occupied Balkh, which is close to Haibak; and we may suppose that the Buddhist monks would receive but little mercy from the victorious followers of the Prophet. This period, from the first century to the end of the sixth, includes the time when the buildings now known as Sassanian were erected.

It will be understood from this Paper that all round, curved, or domical forms found in Indian architecture are not derived from buildings which were originally constructed on the arch principle, but that they had their source in structures of wood—more particularly, I think, from bambu. The supply of wood as well as bambu in India will account for this, and will at the same time explain why the arch principle never was developed in that country. We know that in ancient times bricks were used,† and the old Buddhist *lâts* afford evidence that stone could be quarried and worked,‡ though the architecture of India was not developed from those materials. In tracing the form of the caves from near Buddha Gaya to Afghanistan and Central Asia, it must be confessed that its simplicity gives but a slender means of comparison; still, all the main features of the Behar caves are found more or less in a rude condition in the Afghanistan ones; and it should be remembered that in no case do we know of caves being excavated where a previous structural form—or at least an already existing type which originated in a structural origin—had not been followed; and as I know of no caves nearer to Afghanistan than those in Behar, the conclusion seems reasonable that the forms were carried from that locality. The fact of missionaries being sent from Pataliputra, or Patna, is sufficient to explain how the transmission took place; the constant stream of pilgrims to Buddha Gaya would also explain it, if the other failed to do so.

It is only when we cross the great mountain range which forms the natural southern boundary of Central Asia that we come upon evidence that the constructive

\* The work known as *The Life of Apollonius of Tyana* mentions the Cave of Prometheus as existing in the mountains of Afghanistan. As this might be considered as evidence that caves were then in existence—that is in the first century A.D.—I would say that no reliance should be placed on the statements in that book—at least, so far as they relate to India.—W. S.

† *Arrian's Indian History*, ch. x., Rooke's translation, vol. ii. p. 202.—W. S.

‡ Some of the *lâts* are 20 and 30 ft. in length, formed of one block of stone. *Lât* means a "stick" or "staff," which these monuments resemble; but in the sense here used it means the pillars erected by the Buddhists, on which inscriptions were engraved. The *lât* at Allahabad is 33 ft. in length, 3 ft. diameter at the base, and 2 ft. 2 in. at the summit.—W. S.

dome had existed there in the past. Here we find the conditions that led to this. Wood was scarce, and brick became the building material; I believe that sun-dried bricks or mud were most in use; and wherever this was the case, we find that the arch and the barrel-roof existed from a very early period. From sculptures we know that domes were constructed in Mesopotamia at a far back date. In Central Asia we have no evidence of this kind; and possibly, from the absence of sculptures in that region, evidence may never be forthcoming; but this Paper will in itself help to favour the supposition that any mode of building prevailing in one of these countries was probably practised in the other.

This scarcity of evidence will also make it difficult even to hazard a guess in which of the two localities the dome first originated. The early civilisation of Mesopotamia is well known, and this might lead many to suppose it to be the birthplace; but the civilisation of Central Asia is also very old, and equally as celebrated. The knowledge regarding it which seemed to be current here at the time of the Afghan Boundary Commission, was that the country was nothing but desert, and not worth quarrelling about. At the present day it is little else than a waste, the result of ruin and the reign of anarchy; but that waste is covered everywhere with mounds, the remains of large cities and towns. This is in conformity with what we know—that it was at one time a fertile and very populous country; and it will be the same again in the future. Vambéry, in his *History of Bokhara* (p. 6), quotes Justin's sentence that it was the "Land of the Thousand Cities." Nothing but great mounds now remain of Merv, which was once known as "The Queen of Cities." Balkh was "The Mother of Cities"; at an early period it was the Jerusalem of the followers of Zoroaster, and even at a later date it was looked upon as the "Dome, or Pinnacle, of Islam." If this region was not the birthplace, it was at least the cradle of ancient Aryan civilisation. Ancient Persian history, although mythic, or semi-mythic, points at the same time to this locality as the source of Iranic growth and development. The banks of the Oxus formed the scene of the exploits of the heroes of the Shah Namah. The development of architecture implies the conditions of civilisation; and on this account I have given these rather fragmentary historical references, in order to show that the claims of Central Asia to have produced the dome are—at least, so far as our present knowledge teaches—as good in this respect as that of any other part of the world.

#### A PRIMITIVE BRAHMANIC TEMPLE.

The following account of a primitive Brahmanic temple will show the simple materials of construction employed at one time in India. These were wooden posts, with beams, and a covering of reed mats. Such was the roof of the primitive temple; and here we have the origin of Indian architecture. The altars were of mud, with gravel strewn on them; and the gravel, from its shining, was looked upon as an "ornament." I am indebted wholly to Professor Eggeling for my data.



He is translating the *Satāpatha Brāhmaṇa*,\* as one of the *Sacred Books of the East*, under the editorship of Professor Max Müller. Two Parts (four Books) of this *Brāhmaṇa* have appeared; it is said to be "the most complete and systematic," as well as the most "important" of all the old works of this kind, is wholly devoted to the details of Brahminical ritual, and is curious as showing how elaborate and manifold the ceremonial had been at the period it was produced. In the elaboration of these details there are occasional descriptions of the place in which the ceremonial rites are performed, including directions as to its construction; these are scattered throughout the work, and Professor Eggeling has from the references constructed a plan [fig. 134]. As the plan leaves much to be desired in respect to the meaning and purpose of each part, and as the descriptive references are embedded in something like nine hundred pages of text, which would have to be gone through to find them, I propose here to give from the *Brāhmaṇa*, so far as it supplies the data, whatever may throw light on the various parts of the building; and when thus placed together, the details can easily be studied by those who are interested in the subject.

The value of the glimpse we are permitted to have of this early temple will be understood when it is stated that the earliest remains yet known of Brahminical temples in India date only as far back as about the sixth century A.D.; while the temple described in the *Brāhmaṇa* takes us to a period about a thousand years before. This thousand years represents very nearly the period of Buddhist supremacy. In the group of temples at Bhuvanes'vara we see what the Brahmanic temple had become when Buddhism was passing away; in this primitive temple we can form some notion at least of what a Brahminic temple was before the faith of Sakya Muni had acquired power and influence. The contrast, it must be admitted, leaves much room for speculation.

It may be noted in the beginning that the temple seems to have been intended only for the religious ceremonies of one individual and his wife, the only persons present being the Brahmans, to whom various functions were allotted. The principal functionaries were the *Adhvaryu*, the celebrant of the material part of the sacrifice; the *Udgatri*, or chanter of hymns; the *Hotri*, or reciter of solemn sacrificial prayers, and the *Brāhman*, or superintendent of the entire ceremony. The place ought perhaps to be looked upon as the private chapel of some man of importance, probably of a Rajah, and one of the principal rites described is that of the man's initiation into Brahminism. Although the date of the *Brāhmaṇa* is late in comparison with documents that we have from other systems, still it refers to the Brahmanical system as it existed previous to the production of the book, and it may be taken as representing, not the simplicity, perhaps, of the early Vedic period, but the Vedic system before it was much affected by the aboriginal religions of India. Some parts of it can be traced

\* The two volumes of the *Satāpatha Brāhmaṇa* are vols. xii. and xxvi. of *The Sacred Books of the East*. In the references which follow in the foot-notes, I shall give vol. xii. (80. Oxford, 1882) as "Pt. I." and vol. xxvi. (80. Oxford, 1885) as "Pt. II."—W. S.

back to the period of the Aryan separation, and this of course gives an importance to many of the details. Professor Eggeling in his introduction does not venture on a definite date for the *Brāhmaṇa*, but, roughly, about three or four centuries before the Christian era may be given as the period.

The first illustration I shall give you will be evidence of this ; it relates to the site of the temple, and it is more Zoroastrian than Brahminical, if we test it by later practice. "They choose a place of worship. Let them choose (the place) which lies "highest, and above which no other ground rises ; for it was from thence that the "gods ascended to heaven, and he who is consecrated indeed ascends to the gods. "He thus sacrifices on a place of worship frequented by the gods ; but were any other "part of the ground to rise above it, he would be lowered while sacrificing : let them "therefore choose (the place) which lies highest." \*

The temple was oriented on a line running due east and west, but an older system appears in this case, which pervades the whole of the ceremonies, as well as the position of the temple and its parts. This was the "four quarters." Orientation in most of the old systems included all the cardinal points ; among the most primitive tribes this is found to be the case ; the American Indians associated it with the four winds. The quarters had to be considered in the site of this temple. "While being high "that place should be even ; and being even, it should be firm ; and being firm, it "should incline towards the east, since the east is the quarter of the gods ; or else "it should incline towards the north, since the north is the quarter of men. It "should rise somewhat towards the south, that being the quarter of the Fathers. "Were it to incline towards the south, the sacrificer would quickly go to yonder "world ; but in this way the sacrificer lives long : let it therefore rise somewhat "towards the south." † It may be added that the west was the quarter of the snakes. ‡ The "Fathers" here mean the *manes* or the dead, which contrasts with the Egyptians, who placed the land of Amenti in the west ; and with the Chinese, whose rule is to make their houses to face the south, as the most favoured position.

This is followed by a qualifying statement which may be worth quoting :—"Verily, "this whole earth is divine : on whatever part thereof one may sacrifice (for any one) "after enclosing (and consecrating) it with a sacrificial formula, there is a place of "worship. It is, however, the officiating priests that constitute the place (or medium) "of worship : wheresoever wise and learned Brāhmins, versed in sacred lore, perform "the sacrifice, there no failure takes place : that (place of worship) we consider the "nearest (to the gods)." § This expresses a broad and exalted idea of a temple, but at the same time indicates the high importance of the Brahman as a priest, which may have been the object intended ; or it may have resulted from the absence of hills in the plains of India. Perhaps both of these causes influenced the change from the earlier rule.

"On this (ground) they erect either a hall or a shed, with the top-beams running "from west to east ; for the east is the quarter of the gods, and from the east west-

\* Pt. II. p. 1.

† *Ibid.* pp. 1, 2.

‡ *Ibid.* p. 4.

§ *Ibid.* pp. 2-3. —W. S.



"wards the gods approach men: that is why one offers to them while standing with 'his face towards the east.'"\* The "eastern position" is here very distinctly defined, but the architectural character of the structure is in the present case of more interest. No stone or brick was used; it was so primitive that it could scarcely be called "wooden"; it was merely formed of posts and beams, and covered with reeds and mats, and could only be described as belonging to the "thatch" period in architecture. The churches in Abyssinia† are, with few exceptions, constructed of this material. "They enclose it on every side, lest it should rain upon (the sacrificer, while being 'consecrated): this, at least, is (the reason for doing so in) the rainy season. He who 'is consecrated, truly draws nigh to the gods, and becomes one of the deities. Now 'the gods are secreted from men, and secret also is what is enclosed on every side: 'this is why they enclose it on every side.'‡

This highly developed and mystical sacerdotalism is in curious contrast with the

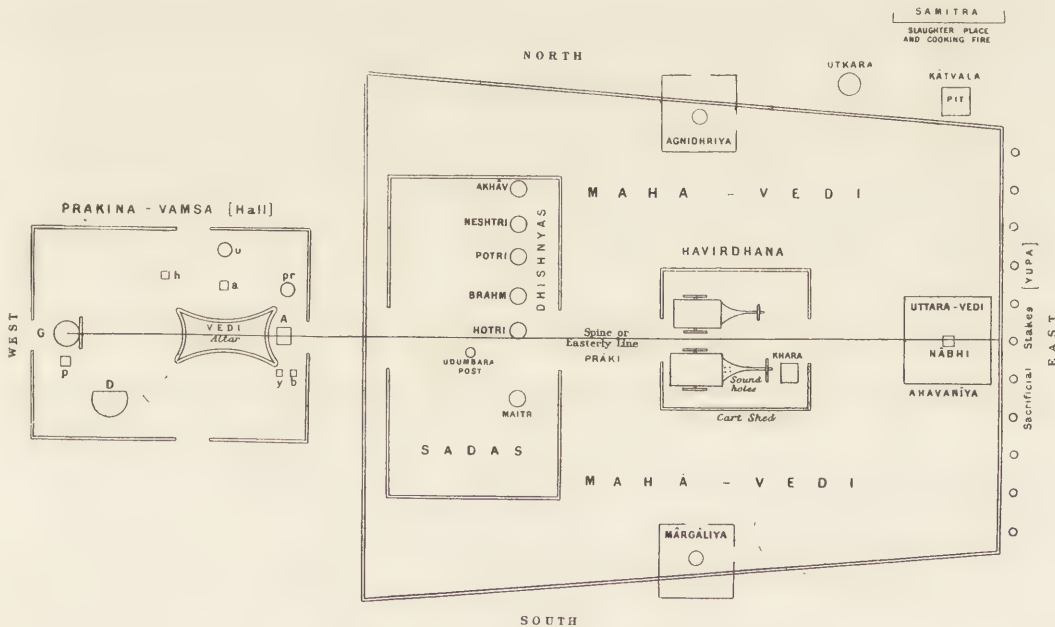


FIG. 134.—PLAN OF SACRIFICIAL GROUND.

simplicity of material and construction of the temple; and this primitive simplicity appears also in its consecration, which is done with two churning-sticks. "In the first place, having taken the two churning-sticks in his hand, he approves of the hall. "Taking hold of the chief post of the front (east) side, he pronounces this sacrificial formula, 'We have come to this place of worship on earth, wherein all the gods 'delighted.' Thereby that (place of worship) of his becomes acceptable to all the gods,

\* Pt. II. p. 4.—W. S.

† See Mr. Simpson's Paper on "Abyssinian Church Architecture," in

TRANSACTIONS, 1868-69, pp. 234-246.

‡ Pt. II. p. 4.—W. S.

"as well as to learned Brāhmanas versed in sacred lore; and that (place of worship) of his, which those Brāhmanas versed in sacred lore see with their eyes, becomes "acceptable to them." \*

It will be seen from the plan [fig. 134] that there are two sheds, each being on the axis of the line running from east to west; the larger structure is called the "Maha-Vedi," or great altar; and the other is the "Prākīna-vamsa." The smaller shed seems to have been—as far as I can make out from the detached references—a complete chapel in itself, and where some of the ceremonies were performed. The eastern altar in it is called the Āhavanīya, the same name as the altar in the greater shed, and in one part of the ceremonies the fire is removed from the western altar to that of the Maha-Vedi,† and the smaller chapel then seems to become a secondary part of the whole. Within the greater shed there are two smaller sheds; these are also on the axis of the eastern line. The one towards the western end is called the "Sadas," and the other the "Havirdhāna."

Professor Eggeling gives a long footnote in which the Prākīna-vamsa, or western of the two principal sheds, is described. "Prākīna-vamsa. The 'vamsas' are the "horizontal beams supported by the four corner-posts. In the first place two cross-beams are fastened on the corner-posts, to serve as the lintels of the eastern and "western doors. Across them tie-beams are then laid, running from west to east, on "which mats are spread by way of a roof or ceiling. The term 'prākīna-vamsa' refers "to these upper beams (*upari-vamsa*), and especially to the central beam (*prishtha-vamsa* or *madhyavala*), the ends of which rest on the middle of the lintels of the "eastern and western doors. Inside the Prākīna-vamsa there is the Āhavanīya fire "immediately facing the east door; the Gārhapatya fire facing the west door; between "the two the altar; and south of the latter the Dakshināgni. The shed (*vimita*) is to "be erected on the back (west) part of the sacrificial ground, after the roots have been "dug up. It is described as a square structure of ten (or twelve) cubits, somewhat "higher in front than at the back; with doors on each side (except, optionally, on the "north). The Sālā, or hall, is to measure twenty cubits by ten." ‡

From this description it would seem that, with the exception of the slight dip from west to east, the roof was flat. I do not find any explanation of the word "Āhavanīya," "the head of the sacrifice, for the head is the fore part,"§ and as it is in the east, the quarter of the gods, I presume it is dedicated to them. The east is the front, the west the back, and the north and south are left and right. "Gārhapatya," I suppose, is from *Garh*, a house, and may be called the household fire: Dakshināgni I take to be the southern fire; it is also called the Anvāhāryapakana.|| As a large part of the ceremonial consists of oblations of milk, butter, cakes, and messes of cooked rice, which are prepared on the fires, the parts of the structure used for this purpose occupy a most important place in all the details of

\* Pt. II. p. 5.

† *Ibid.* p. 122, note.

‡ *Ibid.* p. 3, note.—W. S.

§ Pt. I. p. 87.

|| *Ibid.* p. 338.—W. S.



the ritual—so much so, that they may be looked upon as constituting the essential parts of the temple, and the shed is a mere covering to protect the performers from the weather. To prepare this food for the offerings a large number of articles were required, among which were a mortar and pestle to husk the rice, stones to grind it with, cooking-pots, spoons, &c. There were also two carts, which will be referred to further on. It may be stated that sacrifice constituted the principal part of the Vedic system; Professor Eggeling explains in a note\* that the sacrificial cake is a symbol or substitute for an animal sacrifice, and that the animal sacrifice, again, had been a substitute for an original human sacrifice. These changes, he explains, upon what is now a recognised principle, resulted from an advancing civilisation, which rejected the human sacrifice for the animal; and finally, even the animal sacrifice was superseded “by various materials of human diet.” The *Brâhmana* itself gives sufficient details to justify this explanation.

It would be interesting to give the various forms of symbolism attributed to these fires, but this Paper would become a very long one if this were done. Those who have a desire to study this part of the subject must refer to the *Brâhmana*.

In the smaller shed there is a Vedi, or altar. The explanations connected with this part of the temple are so curious, that a slight reference or two may be given. A mythical story is first related, wherein the Asuras—a word which means either the aboriginal inhabitants, or their gods—were dividing the world among them. The gods—in this case the gods of the Aryans—became anxious lest they should get no share in it. So they went to the Asuras, placing Vishnu, as the sacrifice, at their head.† On demanding a share, the Asuras rather grudgingly granted the request, but it was to be only as much as Vishnu could lie upon, and he on this occasion appeared as a dwarf—a form of one of his avatars. This was accepted, and Vishnu was “laid down eastwards,” where he was enclosed on three sides by the metres: on the south by the Gâyatrî metre, on the west by the Trishtubh metre, and on the north by the Gagatî metre. These are very sacred invocations. On the east was Agni—that is, the deification of fire,—on the plan it will be seen that this is the position of the Âhavaniya fire. The story is meant to illustrate the immense power there was in the act of sacrifice—for “by it they obtained (*sam-vid*) this entire earth; and because they “obtained by it this entire (earth) therefore it (the sacrificial ground) is called Vedi (the “altar). For this reason they say, ‘as great as the altar is, so great is the earth;’ “for by it (the altar) they obtained this entire (earth). And, verily, he who so under-“stands this, wrests likewise this entire (earth) from his rivals, excludes his rivals from “sharing in it.”‡ Finally, as described in other parts of the *Brâhmana*, the sacrificer—that is, the individual for whom the place is constructed—by means of sacrifice, conquers all three worlds, or heaven, earth, and patala, or the underworld.

I cannot make out the height of the altar. “Three inches deep” § is stated, but I feel uncertain how the words should be understood. The top was to slope towards the

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\* Pt. I. pp. 49-50.

† *Ibid.* p. 59.

‡ *Ibid.* p. 60.

§ *Ibid.* p. 61.—W. S.

east and the north, the same as the ground on which the temple stands,—the reasons given for this are similar in both cases.\* There are a number of seats in this shed for the sacrificer, his wife, and the priests, the names of which are given on the plan.

The erection of the Udumbara post is an important ceremonial. Its position will be seen in the plan. Professor Eggeling explains that,—“The post is to be furcate “at the top, and between the branch-stumps (forming as it were its ears) he [the “Sacrificer] is to put a piece of gold and pour the ghee thereon; when the ghee “reaches the ground, he is to pronounce the final ‘Svâhâ!’ in accordance with the “practice at the homas; the gold representing, as it were, the sacrificial fire.” †

One peculiar part of this place of worship is the Havirdhâna, in which two carts were placed. The word “Haviryagna” seems to have meant the “offerings of milk, “butter, grain-food, and similar materials;” ‡ and “Havirdhâna” the place where the various articles were kept for the ceremonies. Soma was also one of the articles of sacrifice, and the materials for producing the Soma were kept in the carts, hence the term “Soma-cart” is used, and the shed was also called the “Soma-cart shed.” §

The following quotation will illustrate this, and at the same time give an idea of the peculiar symbolism of this primitive place of worship:—“The sacrifice is a man; “it is a man for the reason that a man spreads (prepares) it. In being spread it is “made just as large as a man: this is why the sacrifice is a man. The Soma-cart (shed) “is no other than his head, and has Vishnu for its deity. And because Soma is therein— “Soma being havis (material for offering) for the gods—therefore it is called Havir- “dhâna (receptacle of havis). The Âhavanîya is no other than his mouth; hence, “when he appears on the Âhavanîya, it is as if he poured (food) into the mouth. The “sacrificial stake is no other than his crest-lock; and the Âgnîdhriya and Mârgâliya “are his arms. The Sadas (tent for the priests) is no other than his belly: wherefore “they feed in the Sadas, for whatever food is eaten here on earth all that settles down “here in the belly. And because all the gods sat (sad) in it therefore it is called Sadas: “and so do these Brahmans of every family now sit therein. And the two fires which “are behind it are his feet.” That is, the (old) Âhavanîya and Gârhapatya fires of the Prâkîna-vamsa. “The cart-shed has doors on both sides; and so has the Sadas “doors on both sides: hence this man is perforated from one end to the other. He “steps to the Soma-carts when they have been washed down. They turn them “round, the southern one on the south side, and the northern one on the north side. “The larger of the two should be the southern (or right) one. Over them, having been “turned round (and placed on the altar), they put a mat of reed-grass; or, if he “cannot procure a reed-mat, a frame of split cane made in like manner as a reed-mat. “They fasten a front-band (to the posts of the front door). They enclose (the carts) “within two upright hurdles; and lay a (second) reed-mat, or a frame of split cane “made in like manner as a reed-mat, behind (the first mat).” || Here Professor Eggeling supplies a note, and although it is long, as it deals with the construction of

\* Pt. I. p. 63.

† Pt. I. pp. xv., xlviii.

§ Pt. II. p. 126.

Pt. II. p. 145, note.

|| *Ibid.* pp. 126-8.—W. S.



the cart-shed, it had better be quoted in full:—"It is not clear to me whether the arrangements mentioned in this paragraph refer to the carts in the first place, and have then to be repeated after the shed has been erected, or whether, as I think, some of them refer to the shed only. Even at the time of the Kâty-Sûtras there seems to have been some confusion in this respect. . . . It is, however, certain that the carts were covered with mats, previously to being shifted from the back to the front of the altar. As regards the shed, it seems to have been constructed in the following way. In front of the carts, as well as behind them, beams are driven into the ground, six on each side; the two middle ones, one cubit north and south of the 'spine' respectively, forming a gateway on each side. On these two rows of beams other beams are laid, running from south to north, and forming, as it were, the lintels of the gates; and thereon the tie-beams rest (west to east). This frame of timber is to form a square of nine (or ten) cubits. Over the tie-beams three mats of reed-grass (kadis)—measuring nine (or ten) cubits by three ( $3\frac{1}{2}$ )—are spread, from south to north; first the middle one and then the two others, behind and in front of it. Upright hurdles (or reed-mats) are then stretched between the respective corner-posts, so as to form the south and north sides of the shed; and are 'sewn' to the corner-posts. Between the tops of the two front door-posts a band or garland of plaited reed-tufts (or, according to Haug, a bunch of Darbha grass, consisting of dry and green stalks] is hung up, to represent either a fillet or wreath worn on the forehead (?) or as door-garland." \*

In the Havirdhâna there is a square form with the word "khara" attached to it, this is merely a raised square mound, covered with gravel, for placing vessels upon.† The word "khara" seems to mean "hearth-mound." ‡

At the eastern end of the Maha-Vedi, or great shed, is the Uttara-Vedi, or eastern altar. This is also called the Âhavanîya, for in some of the ceremonial it supersedes the Âhavanîya in the smaller shed. Its construction, and some of the symbolism belonging to this altar, is given in the *Brâhmana*. "He makes it on each side either of the size of the yoke, or ten feet of the sacrificer's; for the Virâg consists of ten syllables, and the Virâg is speech, and the sacrifice is speech. In the middle he makes, as it were, a navel, thinking, 'Seated in one and the same place, I shall 'sprinkle (ghee) all round.' He sprinkles it with water: inasmuch as, on that occasion, she became a lioness and roamed about unappeased—water being (a means of) appeasement—he appeases her with water. And, the high altar being a woman, he thereby fits her for the gods: this is why he sprinkles it with water. He sprinkles it with, 'Thou art a lioness, overcoming the enemies: get thee pure for the gods!' He then bestrews it with gravel. Now gravel certainly is an ornament, because gravel is rather shining. And that gravel being the ashes of Agni Vaisvânara, he is now about to place Agni thereon, and so Agni does not injure it: this is why he bestrews it with gravel." §

\* Pt. II. p. 128, note. † *Ibid.* p. 140, note. ‡ Pt. I. p. 393, note. § Pt. II. pp. 119–20.—W. S.

On the north of the Uttara-Vedi is a pit called "kâtvâla;" this is where the earth is dug from to make the altar. The Uttara-Vedi is about ten feet square, and the Nâbhi, or navel upon it, is a hollow, a span square.\*

Near to the Kâtvâla is the Utkara, which is a place for throwing rubbish, and there is a similar place with the same name in the smaller shed.

On the east of the Maha-Vedi there are eleven sacrificial posts; there is a twelfth, which "lies aside rough-hewn" on the south of the altar.† There were at times eleven victims, and these were either fixed on one post, or a post for each was erected. The erection of one post only is described, and so many details are given that I forbear to quote them. There was a ring at the top, and the stake was girded with a triple rope of "kusa grass," which being threefold has some resemblance to the Brahmanical cord.‡ There is one detail which may be worth quoting from its bearing on a well-known feature of Hindu architecture. The post,—"it is (made to be) eight-cornered, for eight syllables has the Gâyatrî (a sacred invocation used at the beginning of most of the ceremonies), and the Gâyatrî is the fore-part of the sacrifice, "as this (stake) is the fore-part of the sacrifice: therefore it is eight-cornered."§ Eight-cornered pillars are common in early Hindu architecture,|| and here we find a possible origin for them.

I have now gone over the principal features of this primitive place of worship. By means of the plan and the references, it is possible to realise the temple on very assured data; and although the *Brâhmana* cannot be dated many centuries beyond the beginning of the Christian era, yet the temple existed previously to the book which describes it, and it thus takes us back to an early date of the Vedic system, showing us at the same time a glimpse of the worship of the primitive Aryans, before Brahmanism was affected by later changes. In this place of worship described in the *Brâhmana*, we have "hearths," "fires," and a large amount of food-cooking in the ceremonial, all suggesting that it may be only a development of the early and simple religion of the Aryan race. The Parsee fire temple is probably also a development from the same source, and if such should turn out to be the case, a knowledge of this place of worship brings us a step backward, and nearer, to the worship which existed before the Aryan separation. The primitive Aryan is supposed to have worshipped at the household hearth—the origin, probably, of the Brahmanical temple just described, as well as of the Parsee fire temple.

Stupas probably existed before Buddhism; ¶ and the pre-Aryan race, no doubt, had temples. But architecture had not made much progress with the Aryans when they became the conquerors of India, and the combination of mats and thatch in the place of worship which has been described helps to confirm this. When they became

\* Pt. I. p. 392, note. † Pt. II. p. 175. ‡ *Ibid.* p. 172. § *Ibid.* pp. 167, 174.—W. S.

|| See Fergusson's *Indian and Eastern Architecture*, pp. 140, 150, 154, 155, 156 (ed. 1876). Some of these pillars are sixteen-cornered in the upper portion, which may have been a development from the primitive eight corners.—W. S.

¶ *The Mâha-Parinibbâna-Sutta*, or Book of the Great Decease, by T. W. Rhys Davids. *Sacred Books of the East*, vol. xi. p. 93.—W. S.



settled in India, their palaces were built for them by the aborigines. Origin in Indian architecture, so far as it has yet been traced, goes back to the structures of the non-Aryans. It was at first essentially "wooden," but I should hesitate in coming to the conclusion that stone was entirely unknown as a building material in India before Asoka's time. It is now supposed that it was from the Greeks that the people of India derived the use of stone for building purposes; but I think the inference is very doubtful. The oldest stone remains are of the Asoka period, about 250 B.C., rather less than a century after Alexander's conquest. The Greeks he left were not in India, but in Bactria, on the banks of the Oxus, where they developed that peculiar style, a mixture of Greek and Buddhist architecture, which at a later period extended across the Indus, as far, at least, as Kashmir and the Punjab; but I doubt if their influence could possibly have reached Muttra, Sanchi, and Buddha Gaya, where we find stone remains as early as the time of Asoka. The Greek influence possibly did not reach the Indus for some centuries after Alexander's time; and the question as to how far south that influence extended beyond the Punjab has yet to be determined. Again, at Sanchi, Bharhut, and Buddha Gaya, the architectural forms are none of them Greek; we find at these places only the wooden Indian forms translated into stone. Some of the details of Indian architecture point to a connection with the Euphrates valley, but the date of this connection is so early that we have no historical knowledge of it. Most of the Indian forms can be traced back to wood; some of the curved forms resulted from the use of bambu; the Bengal temple is admitted to be of thatch origin,† and the primitive Brahmanical temple described shows that there was a time in India when thatch was largely employed for structural purposes.

WILLIAM SIMPSON.

\* \* The Discussion [see verbatim report in *The R.I.B.A. Journal*, Vol. VII., p. 245] of Mr. Simpson's Paper was opened by Mr. R. Phené Spiers, F.S.A., and continued by Mr. Kidner and Mr. John Slater. A brief abstract of their remarks is here appended:—

MR. R. PHENÉ SPIERS, F.S.A., *Member of Council*, thought that to the form of hut [fig. 115] still used by the Toda tribe, of Southern India, the origin of the chaitya hall might safely be attributed, and enough had not been said of its structural character, which was copied in all the chaityas and used as a piece of decoration all over the façades [figs. 113, 114]. He thought the rock-cut caves at Haibak [Illustn. vi] remarkable, and that they were copies of buildings similar in construction to the Sassanian palaces he had described on a former occasion [pp. 37–61 ante], or at least of similar buildings which had once existed in the immediate neighbourhood of the caves. The dome, the pendentive, the elliptical forms of arch, which were dominant in Serbistan and Firouzabad, were to be seen, feature for feature, in these caves—proving, he thought, that the forms cut in the rock at Haibak and Bamian were copied from buildings originally constructed of bricks, probably sun-dried,

\* See also Draupadi's Ratha, at Mahāvallipur, Madras. *Cave Temples of India*, p. 116.—W. S.

which had disappeared, in the same way as the façade of the chaitya hall was copied from earlier buildings constructed with bambu.

MR. W. KIDNER, *Fellow*, referring to the typical Chinese roof, which he had carefully examined during his residence in China, said that it was constructed of two stiff bambu poles lashed together, forming with the ground, as its base, a triangle—the top ends of the poles crossing one another and projecting. The ridge was composed of two other bambu poles, the smaller ends of which were lashed together in the centre and naturally sagged. The whole thing was covered with cotton stuff dyed with the native blue, and if this covering had only inclosed the space occupied by the triangles and the ridge-pole, it would have been too small for any practical purpose. They therefore put up at each end of the ridge-pole two other bambus, on either side of it, the thick end of each bambu resting on the ridge-pole, with the thin end supported on an upright pole. The cloth thrown over this bambu frame formed in outline a typical Chinese roof.

MR. JOHN SLATER, B.A. Lond., *Member of Council*, referring to the ceremonial car, and the explanations given by Mr. Simpson of the car of Jagganatha, alluded to the totem of the family as the origin of nearly all religions, and to the probability that this totem was carried about by the ancestors of these Indian tribes, most of which were nomadic, and borne on a car which, being recognised as the abode of the deity, was regarded with special reverence. Thus when these nomads settled down, they would naturally take the form of the car as the type of the temple—much as in Judæa the tabernacle formed the prototype of the Hebrew temple.



LXXXIV.

DECORATIVE PAINTING.\* By J. McKEAN BRYDON, *Member of Council* ;  
Mr. W. B. RICHMOND, A.R.A. ; and Mr. N. H. J. WESTLAKE, F.S.A.

Mr. J. Macvicar Anderson, *Vice-President*, in the Chair.

MR. VICE-PRESIDENT AND GENTLEMEN,—

OWING to the sad circumstances in which the Art Standing Committee find themselves this evening, through the unexpected death of our noble and beloved comrade, Mr. Sedding, I have been asked to say a few words, by way of introduction both of the Papers of the accomplished artists which will be read to you to-night, and of the subject to which they relate.

As you are aware, Mr. Sedding had undertaken this onerous duty, and perhaps I may be allowed to claim your kind indulgence on account of the short time at my disposal for the preparation of a Paper worthy of this occasion and the sense of personal loss under which we all meet. Indeed, it seemed at first as if the most fitting tribute to the memory of such an enthusiastic worker and devoted student of Art as Mr. Sedding could best be paid by leaving his eloquent silence to read its own true lesson ; but yet, if we have learnt to know him aright, second thoughts must tell us that in work and not in mourning can we honour him the most.

The subject of Decorative Painting is comprehensive ; its scope and its methods are alike interesting, particularly to the architect ; and it is from the architect's point of view that my few remarks will be chiefly given. "The term Decorative Painting," said Mr. Walter Crane on one occasion, "implies the existence of painting which is not "decorative ; a strange state of things for an art which primarily and pre-eminently "appeals to the eye." Well, I am afraid it is not a state of things to which architects are utter strangers ; indeed, it is notably the other way. There is in our midst much painting which is very decidedly not decorative. For example, there is the painting required by the ground landlord which meets us in the face all over London—the familiar stipulation that the outsides of certain houses on certain estates are to be

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\* In consequence of the expense involved in the satisfactory reproduction of coloured drawings, the Council have been unable to sanction any pictorial illustration of these Papers.

painted once every three years, probably to some colour settled by the official mind of a surveyor or his clerk—that the insides shall be painted once in every seven years, all such graining and varnishing as existed aforetime to be carefully re-grained and re-varnished, and the papers renewed at so much a piece, as if all internal decoration had been for ever classified and ticketed, like so much stuff in a draper's window: "This style 1s. 11½d., and any length cut." It is all a matter of pounds, shillings, and pence, and anything in the nature of Art is never so much as dreamt of. Yes, we architects can assure Mr. Crane he is quite right; there is much painting that is not decorative—the astonishing thing is that under the circumstances there should be any at all. But there *is* a little now and then, which comes to us as the breath of Eden, and we have to consider what to do with the beautiful stranger. I say beautiful advisedly, for to be decorative it must be beautiful, and dainty, and lovable withal; a joy to the eye and a pleasure to the soul, a rest from the toils and cares of life; and to be beautiful it is of the first importance that it be in harmony with its surroundings. And it is here again that we architects have something to say. For what is decorative painting? I leave to experts the answer as to its methods, and you will be instructed thereon presently; but in itself it is simply the enriching the work of the architect by means of colour and design, concentrating the interest in and enhancing the glory of the architecture of which it is the handmaiden. Hence it must also be in sympathy with the architectural style of the building, yet never so obtrusive as to destroy the form of the features it adorns. It must also be appropriate, not only to the purpose of the building generally and to the apartments therein, but in particular to their situation, aspect, and material. And in order to secure these results it becomes doubly essential that the architect and the decorator should acquire a knowledge of each other's work, for just as in order to produce any great architectural result the architect must think of his plan and his elevation as of equal importance, interdependent the one on the other, so in like manner must he think of the decoration that is to clothe the walls and the ceilings, to sparkle in the windows, or to adorn the floor. It may be admitted we have made great advances in these respects of late years. It may be almost taken for granted that our ordinary houses are sometimes considered as places in which to live, in addition to being media for fulfilling the requirements of a ground lease. That their wall coverings are sought to be brought into harmony with what may be placed upon them, and not only so, but even the wall itself, receives some architectural acknowledgment—at all events as far as the admission that its base and its cornice belong to itself, and not the one to the floor and the other to the ceiling: some daring spirits even conceding that all decoration need not necessarily stop short at the wall-head, and the ceiling be left a yawning expanse of greyish white.

Yet are we not far from the days—if even they be past—of imitation woods, and stones, and metals, and the inconsistency of the subjects in a painted window sprawling across the surface regardless alike of mullions or tracery. I say these things, in spite of advancement, are not far from any one of us, and that dreaded



being the "painter and decorator" may perpetrate any or all of them at the instance of the possessor of money, and the little knowledge which is a dangerous thing, before the architect, whose client he may be, has time to say a word. Therefore I plead for the intimate relationship of the arts of painting and architecture, and, were this the time and the opportunity, of sculpture also. For if there is a danger of these things being done in the green tree of our private dwellings, how much more so in the dry of our public buildings? Here we usually have not one man but many men to deal with. The soul of the Vestryman is stirred within him, the voice of the Common Councillor is heard in the land; and the architect, as he steers between the Scylla of stencils and the Charybdis of distemper, longs for the assistance of the trusty painter pilot, whose brush helps him to bring the *Argosy* into the sure haven of Art.

But with the increased importance of the work the problem becomes more complicated, the responsibility heavier, the need for artistic co-operation the more necessary; for if there is one thing more easily degraded by meaningless frippery than another it is the interior of a public hall; while, on the other hand, there is no subject that lends itself more advantageously to rich yet dignified treatment—a broad simple scheme of colour, in which the architectural features are carefully considered, and their effect, be it of dome, or cove, or panel, heightened and brought into harmony the one with the other. As in carving or sculpture, so in painting, it is wiser to concentrate the ornament in few and well-chosen situations, like the dominant chord in a piece of music, than to fritter it away in little abortive efforts all over the place. Hence the panels of the walls or the domes of the ceiling present themselves as inviting fields for figure subjects; they are the permanent pictures, just as easel pictures may be the movable decorations of our homes, and their surroundings must be carefully harmonised therewith, and they themselves so treated as not to look like holes in the wall. Again, they must be in sympathy with the surfaces on which they are painted, acknowledging the flatness of the wall or the concavity of the dome. The scale also of the figures must bear some relation to the architecture of the interior, neither dwarfing it by size nor magnifying it by the infinitely little. Many a fine interior has been ruined by inattention to these first principles. I say nothing as to the particular colours to be employed. One may as well dictate to a musician the tones of his scale. All depends on the keynote of the harmony in either case. It is with painting as it is with music. Listen to Browning's Abt Vogler as he sits extemporising upon his organ:—

Consider it well: each tone of our scale in itself is nought;  
It is everywhere in the world—loud, soft, and all is said;  
Give it to me to use! I mix it with two in my thought:  
And, there! Ye have heard and seen: consider and bow the head!

Ere bringing these few remarks to a close, perhaps I may be allowed to felicitate the Institute on the establishment of evenings such as these, which tend much towards that unity of Art which is at once its strength and its reward, to the

interchange of thought and idea between the votaries of the sister Arts, and especially that bring us within speech of the distinguished painters who so kindly address us to-night.

Let me also direct your attention to the examples of actual work with which we are favoured, and first of all to Mr. Sedding's studies for the decoration\* of his well-known church in Chelsea.

Still looking at our subject from an architect's point of view, we have here an architect's ideas of the relationship of the Arts in the working out of the decoration of a great interior. The painter, with his rich series of subjects in panels; the sculptor, with his statues and carving; the glass painter, with his translucent colour in "storied windows richly dight"; and, combining all in one harmonious whole, the architecture of the master mind, the inspiring genius of this true "Art Workers' Guild"—alas that he should have been taken from us ere he could see the realisation of his beautiful dream!

Then, again, in a totally different school are the interesting designs for the decoration of the Mansion House at Doncaster, interesting because they are probably the work of Paine himself, the architect of the building, and full of suggestion in the present awakened appreciation of the beauties of our own English classic. And, lastly, the admirable sketches of Italian interiors by Mr. Lanchester. Look at the noble character of the work, the magnificent colour, the intention and invention of the design, and the harmony which pervades the whole. In these chambers of the Sunny South we are in the presence of the masters of decorative painting; as with Abt Vogler's music, we "consider and bow the head"—consider the lessons for us in every feature of the glowing scheme, and bow the head before the manifestation of such genius.

A few minutes ago I ventured to say we had made great advances in decorative work of late years: and it is true; at no period had we more earnest students of the true and of the beautiful; at no period had we more skilful hands or more devoted workers. 'Tis a happy augury for the future; and if the glorious record of work done and the wise counsel of the worker avail—as avail they must if we study both aright—for our further progress, in whose presence are we safer or more full of heartfelt hope than in that of the artists who speak to us from their walls, or who shall address us from this desk—men who have both the heart to conceive and the skill to execute great works of decorative art? And with whose encouraging words can I better close than those of the enthusiastic worker whose name is in all our hearts to-night, and whose very presence is almost amongst us? "The past," said the late John Sedding, "has by no means exhausted every Art motive, or robbed us of chances of begetting beauty by the exercise of our hand and brain. Let no one say on leaving this room that 'English Art is not looking up. Let no one say we cannot do fine, big, original things nowadays. Let no one say, 'All is done; I have come too late!' For everything in

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\* This was partly illustrated in *The Builder*, vol. lvii. p. 260. Views of the interior also appeared in vol. lv. p. 250, and vol. lviii. p. 8, of the same Journal.



“the workshop world points to the fact that a golden era is dawning for English Art.  
“The flowing tide is with us, and the British architect is well in the swim of it.”

J. M. BRYDON.

### FRESCO PAINTING.

MR. PRESIDENT AND GENTLEMEN,—

IT is quite clear, I think, that fresco, understood by what the Italians named *buon fresco*, is entirely impracticable in London under the present conditions of our climate. Not so much on account of the damp of the atmosphere, but because of the poisonous air which, without restraint by wise and strong legislation, has been permitted to increase year by year. It would be foolish to hold out any hopes that fresco-painting can be practised in London under conditions of vitiated air such as we suffer from. It has been tried by able hands, and it has failed in being permanent.

Neither could fresco-painting be safely adopted in any of the manufacturing towns of England, where the atmospheric conditions are even more pronounced than in the metropolis. On the other hand, there is no reason why in country churches, town halls, and private houses away from large towns, the fresco-painter might not work with all human certainty regarding the durability of his labours. But on certain conditions only will this happy result be possible. There are two great enemies to the *intonaco* even in otherwise promising circumstances—damp rising from the foundations of buildings, and damp penetrating their walls from without.

I dismiss from any consideration the evils which must, sooner or later, arise to a picture painted in *buon fresco* from gas and other deteriorating poisons, and for the moment imagine that we are to discuss the possibility of the adoption of fresco under circumstances such as the Italian painters had to contend with.

In Italy, wherever the walls (upon which the fresco-painter has worked) have been well built of good stone, his frescoes survive; excepting where damp has destroyed them, or they have been destroyed by the Philistines of the sixteenth and seventeenth centuries. For example, Giotto's work at Assisi, in the lower church, is, in most cases, as fresh as on the day it was painted. In the upper church, the work is ill preserved, owing to the porous nature of the stone whereon it was executed. In the Arena Chapel at Padua, the work of Giotto and Avanzi is very completely preserved. In the same city the frescoes by Mantegna in the Eremitani have suffered from damp, but chiefly in those portions where tempera was more largely adopted than *buon fresco*. In Panicale, a city perched on a high hill overlooking Lake Trasimeno, Perugino's Martyrdom of St. Sebastian is brilliant and fresh. At Orvieto, in the cathedral, Luca Signorelli's and Fra Angelico's frescoes are intact, with the exception

of one corner on the south-east wall of the chapel. Damage was done here by an overflow from a water-pipe, consequently a portion of the painting has disappeared. The monastery of San Marco in Florence has been singularly happy in the preservation of Fra Angelico's Crucifixions, and his smaller works in the corridors. Upon the whole, the vault of the Sistine Chapel is well preserved; not much damage has happened, save through earthquake and consequent cracks, and the smoke of candles, which has blackened the colour of both the vault pictures and the "Last Judgment." The *Stanze* of Raphael is, on the whole, in very complete condition, especially where the colour has been laid on very thickly, and where retouching with tempera has been least adopted. The numerous works of Luini at Milan are still very fresh; they are painted with a very full brush and largely glazed while the plaster was still wet. Many interesting works by that painter are in the Brera at Milan, interesting because there is very evident use of a wax varnish. That is to say, that a thin varnish of wax, dissolved probably in *olio di sasso*, has been applied on the completion of the works, accounting for the depth and richness of their colouring.

There is no time to mention more instances of the safety of fresco as a durable method, a clear and unpoisoned air being granted. Let us examine how that durability has been attained, and consider the reasons of failure in the case of the wall paintings in the Campo Santo of Pisa as instances.

All Italian writers on art, from Cennino Cennini to Armenino, are agreed upon two points; the first being that the walls must be really dry before the *intonaco* is applied, and that no damp must rise from the ground and affect the dryness of them, either before the painting takes place or afterwards; the second, that the lime used must be old slake lime. Upon other points writers differ. Yet even here we find generally consensus of opinion that finely pounded marble dust should be used for the *intonaco* rather than sand. For these reasons: first, that sand—even river sand—may contain a certain quantity of salt, which renders the lime ever liable to impressions from damp weather. It is on account of the sand taken from the neighbourhood of Pisa, once covered by the sea, that the frescoes in the Campo Santo have decayed. Secondly, sand is less binding than marble dust, the one being of globular particles, and the other possessing angular facets.

All the *intonaco*, whether of the Greek wall paintings, Roman, Byzantine, Mediæval or Renaissance times, is very smooth—a surface indeed like ivory; and this is how it was for the most part made. The bald wall was perfectly dry to begin with. The first coat of plaster, mixed with ordinary lime and coarse sand or marble dust, was then applied and allowed to dry. The second coat of finer materials followed. The last, the *intonaco*, was never more than  $\frac{1}{8}$  and  $\frac{1}{16}$  of an inch in thickness, composed of ground lime well slaked, mixed with fine sand or marble dust. But in this last coat it was found important to put a larger proportion of lime to sand or marble dust than on the previous occasions, so that the crystallisation of the lime should be rather rapid than slow, and the surface when dry might be very hard and firm.

*Terra verde* was sometimes used mixed with white (*i.e.* lime white) for the dead



colouring, but never with success. *Terra verde* is very greasy, and although it renders to the surface of the ground a certain pleasant slipperiness to paint into, it is apt to cause separation of the colours painted over it, as it stops suction, and hence prevents the perfect crystallisation of the lime of the upper layers with those of the lower layers of both *intonaco* and colour.

Where the *verdaccio*, a green grey made of white, raw siena, and black, has been used, as it was by both Florentine and Sienese painters, the result has been satisfactory.

It has been often stated, very wrongly, that fresco was not largely used in the thirteenth and fourteenth and earlier centuries, but that tempera was much more largely employed upon walls. The fact is that all the early wall pictures of Duccio, Giotto, Lorenzetto, and Avanzi are fresco underneath. Tempera was used over the solid preparation of fresco, in thin films of glazes, and hatching with white in the lights. But even so little an employment of tempera is not to be recommended.

Pinturicchio, in the sacristy of the Cathedral of Siena, painted almost entirely in tempera, and very fairly, over a slight sketch in grey executed in *buon fresco*. Though these wall paintings are intact, they are not agreeable in colour or in execution; they are hatched and woolly in surface, and have none of the dignity of execution which *buon fresco* should create. The more *impasto* the colour has, the nobler is the effect. To attain this *impasto* an enormous amount of lime was used with every colour, even in the shadows. By this means great light and brilliancy were attained by Giotto and his followers. In the finest frescoes it is rare to find more than two colours employed in a piece of drapery, and this only where the painter wished to make his colours "*can-giante*"—that is, to put a blue shade for a yellow drapery, or a green shade to a red drapery, and so on. The scale of colours used having been limited, it was necessary to preserve each tint intact and clear, light and fair colour having been the objects desired, rather than what we understand by "quality" and "tone." The "quality" and "tone" were arrived at by exquisite juxtaposition of tints, like a parterre of flowers, not by any variations of colours in the members of the colour design. Hence the majesty, clearness, and brilliancy of the work of the *frescante*. This is the very life of fresco and of all decorative work: that it never shall be pictorial, never greatly embarrassed by light and shadow; that each tint is precious by the harmony it has with its fellow; that every outline is clear, and every colour full of light.

To attempt in fresco what oil-colour can do much better is like asking the violin to give us the full harmonies of an orchestra. Where oil-painting is used, to exhibit light and fair colour, it comes off as badly as fresco does when used as it was by Pordenone and the Bolognese painters, in an attempt to make it serve for the deep and rich tones of oil and varnish colour. The strength of fresco is light, the strength of oil is shade.

In England, light is what we want in decoration—light and colour. We have enough darkness, enough shade, to satisfy our most gloomy desires. Fresco is better adapted than is any other material to that result; better than wax-painting, better than

Gambier-Parry medium, which I am bound to say seems to me unpleasant and opaque both in colour and the surface it reveals. "But how are we to get fresco painted 'here?' will be asked. True, that is a difficult question to answer, for every taste in art is for the moment against that manner of artistic training which will promote the kind of artist who could use such a manly and difficult material. I say manly, because fresco-painting can only be employed by a secure and certain draughtsman, a noble designer, and a colourist of the very purest and simplest instincts. The artistic essence of everything must be given by the decorator—not blurred and smudged, but clearly and resolutely defined.

The modern school, the streaky, dabby, spotty school of recent invention and fashion, can be in no mood for the chastening influence of manly precision, noble drawing, and design. But yet, on the other hand (and there is always a silver lining to a cloud), there is evidence of a growing endeavour to paint light, and to search for out-of-door effects of light, admirably suited to decoration; so that perhaps we may hope that the affectations and follies of much modern practice in art will find their place in the past soon, and what *is* valuable of it may flourish under the discipline of design.

The prices paid for works of art are often so enormous that it would be impossible to expect any sum relative to them from those who build churches or public buildings, for obvious reasons. No fresco or wall paintings are marketable; it is pretty nearly certain they will not find their way to Christie's, or that the picture-dealer will thrive upon them. They must be done for the love of art and for small reward.

Decoration in fresco ought to pay sufficiently well—quite as well as any real artist who loves his work more than money should expect—for the method is *very swift*. A life-size figure can be well finished in a day by an expert hand. The time is absorbed mainly in getting all the designs made on outline cartoons and every tint mixed. When these are completed the painting is extraordinarily rapid. For instance, the "Galatea" of Raphael was painted in five days. The "Prophets" upon the vault of the Sistine Chapel were some of them executed in the same time.

A good workman in fresco ought to earn fifty pounds a week, and in a fortnight produce a considerable work. One hundred pounds for his work ought to pay him, and another hundred for his cartoons. And if we are to have fresco decoration in our country churches—which is most devoutly to be hoped—it can only come about by the consent of the painters to receive moderate reward for their services. If the art of England is ever to become of national importance (which it is not at this moment)—if it is to rise above commercial speculation and the sale-room, it can only be by the adoption of monumental painting, and the alliance of the arts—architecture, sculpture, and painting: for to sever them is to weaken the effect of each.

Permit me to offer, in conclusion, a few remarks on the possibility of architecture and decorative painting joining hands in England, as they once did in Italy. I would suggest that the architects take the matter in hand, and inaugurate a



school of fresco-painters, appoint a master, get a few pupils, and for two years make the experiment. I believe success would be rapid and sure. There is no particular paraphernalia needed for such a school: a big room with four empty walls. Six pupils who, under the supervision of the master, and from his design, should decorate that room in fresco, would be enough to begin with. Absolute obedience would have to be exacted from the pupils, that they might learn the trade from the beginning. From the laying of the plaster and ground to the completion of the more delicate manipulations, scholars should proceed gradually to execute the master's intention as he found them capable. I believe that at the end of two years' training you might turn out a nucleus of a school of fresco-painting hitherto absolutely unknown in England, composed of young men of varied and strong ability, who could be employed by you as decorators, either in the capacity of original designers, or as capable workmen who would be fully competent to carry out designs in a workmanlike manner.

For be it remembered that the modern cry and craze for originality is a very monstrous cry, and a very idle and mischievous desire. The straining after originality is one of the curses of our modern system of life—change and rapid discontent at whatever we are used to being one of the signs of weakness. The really original designers of the whole field of art might be counted on one's ten fingers, but the company of good workmen is innumerable.

This is the principle to instil into the young modern man—the dignity of good work, and his possibility of splendid success, even if his claims as a great original thinker or designer are not sufficient for him to take rank among the very chosen and very rare few.

The cost of such an undertaking as I suggest need not be great. One guinea per head subscription all round from the more cultivated architects, sculptors, and painters of England would make an ample fund; and I believe that, if wisely gone about, there would be no "Nay" to the demand for such a subscription from any member of the artistic community in England who could claim a real love for the promotion of noble art.

A mural painting here and there is not enough. The public needs to be made used to the matter, and to regard a building as incomplete till it has been coloured with delightful pictures and elaborate design.

The decorative artist is at present held in ridicule—why, Heaven only knows: for what is a picture if it is *not* decorative? It is supposed to be beneath the dignity of painting to preserve the flatness of a wall, and all the restraint imposed on the painter by the study of form and colour in the abstract is regarded as old and antiquated. Further, any system which is vigorous and virile is regarded as commonplace and pedantic.

I believe that if some such scheme as I have indicated were carried out, we who care for design, composition, form, and colour would very soon find ourselves upon a strong vantage ground; and that the commercial attitude of art, as at present exhibited, would to a certain extent be modified. Anyhow, a chance would have been given to young men to take serious work for moderate payment, to train themselves in the

higher moods of art, and, for the love of it, to endeavour to give to all country folk—in church, town-hall, or even private house—the generous delight they have had, not perhaps in the conception, but anyhow in the perfect execution, of a work of art.

W. B. RICHMOND.

#### METHODS OF MURAL DECORATION.

MR. VICE-PRESIDENT AND GENTLEMEN,—

MY object is concisely to lay before you certain opinions, the result of my own study and practice. The simplest method of working, and the simplest media and colours have been, and always will be (generally speaking), the most easy of use and the most durable. In England (in London especially) many of the ancient practices of art, and the media with which the colours are mixed, are useless. They were nearly all simple, common-sense practices, the result of experience, and it would be difficult or impossible to question their fitness for their use in their different localities.

The Egyptian paintings of the greatest antiquity are, many of them, as fresh as when originally executed with a slight vehicle on a simply-prepared wall or piece of wood. The artist had not to think of a damp wall or other substance, nor a damp climate, nor of the surface-damp produced by a number of persons breathing in a closed building in close weather—a most potent destroyer of surface-work. The simplest vehicle for drying quickly, just strong enough to hold the colour, giving no opportunity for the attachment of dust or sand (such as an oil or wax vehicle would), was easily made and easily used. It was in every way fitted for its purpose, and the artist's practice; but, by that very fitness to those circumstances, it is totally unfit for any practical use here except where the same conditions exactly exist. A practical proof of this is the fact that in this country nearly all distemper work, even that of comparatively modern date, which has been at all tried by exposure, has had to be covered with varnish.

Many of the methods used by the Greek, Roman, and Italian painters are quite as unfit for our use as are those of the Egyptian. Indeed, the study of ancient work is often of more use as a warning than as an example.

Let us begin with that historic medium "Mosaic," continually quoted as the most durable method of enshrining a work of art. I mean the ordinary glass mosaic, although some of my remarks will apply to any mural mosaic. What are its principal virtues? (1) Its splendid effect from the diverse angles at which the ends of the tesserae are accidentally cut and set, making them sparkle like stars upon the space; (2) a depth and strength of colour, with great breadth and simplicity arising from the nature of the material and its constructional character; (3) its non-absorption of surface moisture. Passing over the fact that modern mosaicists strive to do away with some of the qualities which I have enumerated as virtues, we will consider its defects.



Mosaic is a secondary art. You rely on a copyist and on his power to reproduce your work exactly, unless you study and do it yourself and become, practically, a mosaicist. Those who have designed mosaics know by experience how far the result is oftentimes from their design. It requires a stronger and drier wall than some other methods, because, if the wall-surface be not very sound, the very weight of the tesserae or pieces of vitreous colour will cause them to detach themselves. Many years ago I picked up tesserae in St. Mark's, Venice, which had fallen recently, and were still falling until lately, when the whole work was restored. I looked at the paintings on the walls, and found them less defective than the mosaics of the same period. Among its further defects are the enormous expense of a really first-class reproduction of a fairly good design, and its unfitness for work near the eye, near painted glass, or in altar paintings generally. Its greatest merits demand scale and distance.

Under fitting conditions fresco, or painting on fresh plastered walls, is the cheapest, most durable, and most beautiful method of mural decoration. The first of such conditions is a dry wall, and sufficient ventilation over its surface to prevent the collection of warm moisture from the breath of a congregation, or from a humid atmosphere, attaching itself. Simplicity of colouring is also a physical necessity of befitting conditions, for it is my contention that in following German theories and practices of some years ago, based on those of fresco painters in Italy, modern fresco has gone utterly wrong. The idea that a fresco in this country may be painted in delicate colour and with high finish is, I think, the foundation of a false system. The first principle of this false system is that the finishing coat should be of lime,\* slaked for a considerable time (months, or years); its causticity is thereby sufficiently destroyed to render it powerless over delicate colour. We should, however, remember that at the same time its power of dissolving the necessary silica is lessened. Moreover, if the last coat have too much lime, it lacks that preponderance of silica which, dissolved by the caustic lime and exuding upon the surface of the wall, forms a most durable surface protection to the pigment. If stale lime is used, its caustic properties are so diminished that it does not dissolve silica enough to form a sufficiently hard surface. It is better, therefore, to use lime that has not been slaked longer than necessary, in the proportions of about two-thirds lime and one-third fine sand. Paint only with simple earths and such colours as a caustic alkali will not destroy, and you will have a work sufficiently durable for any reasonable test. Of course the execution must be rapid and simple.

The time devoted to my little Paper will not allow of any description of detailed manipulation. One or two salient points I may remark upon. It is better to use large brushes; and you must work quickly. Avoid a second painting or re-touching if possible, and do not repaint broad, flat masses of colour. Cease work directly the wall commences to dry, and if you are not satisfied the next day, cut it out and

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\* English lime and sand are here referred to. Every difference of lime and sand, found or used in various localities, must be considered. A soft sand is quickly dissolved by a strong lime, and a plaster made of this is fit for use sooner, and will deteriorate more quickly, than a plaster made with a less powerful lime and a harder sand, or with marble dust. On this point, the painter will do well to consult some intelligent local plasterer who is in the habit of using the materials he proposes to work with.—N. H. J. W.

re-plaster. The practice of wetting the wall when cooling is dangerous. Fresco on solid walls is not to be recommended; the thicker the wall the greater the danger, for some very thick walls appear to be for ever exuding salts or substances injurious to painting. Indeed, for every kind of mural painting, there should be allowed an interior wall with an air passage behind and ventilation in front.

The celebrated fresco of Guido, "The Aurora," in the Palazzo Rospigliosi at Rome, is painted on a brick lining or extra wall; the plaster is keyed with nails. I believe they then used copper nails, but we should prefer zinc nowadays.

Of *fresco secco* I shall say nothing; it is a compromise between fresco and tempera, lacking the greatest advantages of either. It has not the velvet surface and transparency of fresco, nor the possibility of that excellent finish and quality to be obtained in tempera.

*Tempera*, or distemper, has been, and is still, practised in a multitude of ways. I remember as a boy, in the country, the local decorators did their work with a vehicle of sour old ale, and varnished it with a cheap resinous varnish. The work was very durable if the ground was good. A panelling of seasoned deal on which canvas has been glued and flatted with good sour old ale and whiting is an admirable surface for such work. Plaster and size mouldings are sometimes attached, and with the groundwork gilded, in water; this also was varnished. The decorative effect of the surface was not improved, but it was thus preserved from damp. On a dry or on a battened wall tempera is an excellent and beautiful method, presenting a dull surface, in quality second only to fresco. The ordinary vehicles are size, gelatine, white of egg with vinegar, beer, or gum-arabic and sugar. Whichever is used, it must not be too stoutly mixed, or the work will crack and scale with heat, besides presenting a horny and ugly surface. The vehicle should be only strong enough to hold the pigment, so that it will not rub off when dry. I have before said that tempera can be varnished, but this destroys its surface beauty.

*Encaustic* is perhaps the most durable of all methods of mural painting under general circumstances. By encaustic I do not mean merely the use of wax nostrums. Wax has been used from time immemorial, and was commonly employed by ordinary decorators long before the existence of either Parris or Gambier Parry\*; it appears to have no advantage unless it be used with heat. An equally dull surface is to be obtained with better vehicles which do not undergo the "yellowing" that ensues with wax, unless it be used for real encaustic. Real encaustic is painting with wax and bituminous media on a porous wall, which painting is afterwards *melted into the plaster* by heat until there is little or nothing on the surface. No bitumen must be used near the lights, as it indelibly stains every other colour. I may here parenthetically remark that no composition of tar, pitch, or bitumen should be used on a wall—

\* Both these gentlemen contributed Papers to the Institute on Decorative Painting: (1) "The Application of the Higher Branches of Painting, especially in Fresco, to Painting," MS. by E. T. Parris, 14 Feb. 1842 [in the Library]; and (2) "Painting in Connection with Architecture," by T. Gambier Parry, *Hon. Member*, in *TRANSACTIONS*, 1865-66, pp. 41-56.



for the purpose of rendering it damp-proof—on which a painting is to be closely fixed, or its staining power will ultimately assert itself through the work. In painting on millboard or like substances be careful also to cut out any tar spots. There are two methods of encaustic painting: one is to paint with wax, &c.\* mixed with some essential oil, which is allowed to evaporate before the heated brazier is brought near the wall; the other is to mix the colours into sticks (pencils) of wax and resin sufficiently hard to work on the wall with; this work is afterwards melted into the porous wall with the brazier, and slightly polished, so as to obtain an eggshell surface. Some years since I carefully examined the old paintings called frescoes at San Clemente, Rome, and found they were really encaustic work. As a proof of the durability of such work, it may be observed that they have undergone the most severe trials of every kind: some of them, I think, have even at one time been built against.

In conclusion, I would advise that in all cases, if there is no false interior wall erected for painting, the existing solid wall should always be lined with thin slate fastened with zinc clouts to the wall, from which the slate slabs should be divided by battens or uprights, also of slate or tile. Curved surfaces can be covered with papier-maché, which can be bent, but will not warp. Panels for altar-paintings are also better covered with canvas, after the fashion of old examples painted in tempera.

N. H. J. WESTLAKE.

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\* \* The Discussion [see verbatim report in *The R.I.B.A. Journal*, Vol. VII., pp. 268–271]—prior to which a letter from Mr. Ford Madox Brown, on the subject of the monumental paintings in the Manchester Town Hall, was read [*ibid.* p. 266]—was opened by Sir Arthur Blomfield, A.R.A., and continued by Professor Aitchison, A.R.A., Professor Kerr, Mr. Hebb, Mr. G. T. Robinson, F.S.A., Mr. Woodward, Mr. Longden, Mr. Nevill, F.S.A., Mr. Paul Waterhouse, M.A., Mr. G. Fellowes Prynne, Mr. Hansard, Mr. James Brooks, and the Chairman. A brief abstract of Mr. F. Madox Brown's letter, and of the remarks of most of the speakers, is here appended:—

Mr. Ford Madox Brown, in a letter to the President, confined his remarks to matters peculiar to his own paintings in the Manchester Town Hall. The late Mr. Gambier Parry had informed him, before he began the work, that one of the chief characteristics of the "Gambier Parry" invention, as regarded durability and avoidance of shine, consisted in the absorbency of the ground or stucco being made use of in preparing the wall for painting, by twice coating it with the ordinary "Gambier Parry" medium diluted with turpentine. The prescribed method named sand and lime only for the ground stucco, but the panels for the twelve paintings he had undertaken in Mr. Parry's "Spirit" fresco were filled in with a stucco formed of sand, marble dust, and lime, trowelled down almost to the appearance of polished marble, and almost non-absorbent. The surface he had roughened with "grit-stone," and, having applied a gas-heater to successive portions of the panels, increased the absorbency so as to cause rather less than a gallon of wall preparation to be sucked in. Seven of the twelve panels had been completed and had stood, the earlier ones for some ten years, the only change being a certain paling of

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\* Sometimes the wall is coated with wax and varnish, and the colours are applied with some simple medium, the whole being afterwards indurated with a brazier.—N. H. J. W.

the colours owing to absorption. By interposing a canvas between the painting and the wall—a canvas cemented to the wall with white-lead, boiled oil, and rosin—the absorbency could be neutralised; and the intervening coating of white-lead, which became hard as stone, served to preserve the picture from any damp in the wall. Critics complained that his work at Manchester was “not Rembrandtesque enough”; but Rembrandtesque effect, all dark with chief objects lit up in strong light, he considered the very reverse of what suited mural decoration, where the chief objects should stand out in dark upon a lightish background.

SIR ARTHUR BLOMFIELD, A.R.A., *Past Vice-President*, thought the Papers gave grounds for hope that the highest efforts of painters and sculptors would not continue to be devoted solely to the production of framed pictures and isolated statues, but also to the embellishment of the noblest works of architects. Viollet-Le-Duc's *Dictionary of Architecture* contained a most valuable article on painting as applied to architecture, which was well worth reading. It laid down in a concise and practical form the general laws which should govern the decoration of a building. One great principle was the supremacy of the architect. The architect's should be the directing mind, or, where that was not quite possible, the minds of the architect and painter should be in harmony, and the latter know something of the architecture of the building he is to decorate. If that principle were violated, an eminent painter would no doubt produce a work of art of great beauty, admired by all as a picture; but regarded as a piece of decoration appropriate to the building, and as a means of enhancing various qualities and features which the architect wished most to emphasise in order to produce a harmonious whole, it must certainly be a failure. To maintain that principle, the architect should know what he wanted—which necessitated more attention to the study of decoration—and the painter should know more of architecture, than most of them did at the present day.

PROFESSOR AITCHISON, A.R.A., *Vice-President*, said the walls of buildings were to him very important things, and though he wanted them beautified both with form and colour, still he wanted them to represent walls. The Byzantines, although inferior to the great masters of Greece and Rome and the great artists of the Renaissance, recognised the feeling that the solid parts of a structure should be ornamented, and not converted into something else. Professor Richmond's remarks on frescoes standing very well in the country he fully indorsed. The marble dust the Professor had spoken of was the old Roman method of executing plastering. Vitruvius stated that the early Roman lime was slaked, and by law was not allowed to be used until it had been kept five years. Referring to originality, he thought it absurd for any one man to suppose he was going to create something better than and different from anything done before; all that could be expected of any one was to take the best of that which immediately preceded him, and endeavour to enrich it by his own originality.

PROFESSOR KERR, *Fellow*, was of opinion that Professor Richmond's doctrine of the supremacy of fresco-painting for mural decoration under the direction of architects was well worthy of the highest consideration. Whether it was possible for the Institute to introduce a school of decoration, such as Professor Richmond proposed, he would not like to say, but he thought the Royal Academy might, and ought to do it.

MR. JOHN HEBB, *Fellow*, said painting had always held its own in mediæval times, and in later times the Sistine Chapel and the Chapel of the Arena at Padua were given up entirely to the painter, who worked without, as far as he knew, any interference on the part of an architect.

MR. G. T. ROBINSON, F.S.A., thought it would be vain to attempt a unity of the arts in any way, except by good sense and good will. As to whether lime should be old before it was used, he was of opinion that it should be very old, as the receipts of Ligori showed. The receipts said that the lime should be composed of old fragments of marble, and be burnt and slaked at least three years before use.

MR. W. WOODWARD, *Associate*, hoped that one outcome of the Papers read that night would be that public interest would once more be directed to the decoration of St. Paul's Cathedral, upon which large sums of money had been paid during the past twenty-five years with very little result.

MR. LONGDEN (Art Workers' Guild) had long formed the opinion that all fine buildings had originally been intended for painting; and of late there was a movement towards colour in buildings. The late Mr. Sedding had worked strongly in that direction, and one of his great merits had been that he encouraged artists of all kinds to work in agreement with him. Sculptors, painters, glass-painters, and workers in all crafts were encouraged to show their originality, always under his guiding hand, and a worthy final result had been always achieved.



MR. RALPH NEVILL, F.S.A., *Fellow*, thought the time had hardly arrived for starting a school of fresco. Before attempting fresco, he was of opinion that it would be better to begin in tempera, the effect of which was very good, and it was easily worked.

MR. JAMES BROOKS, *Member of Council*, said Mr. Westlake was engaged on some pictures in a church erected from his designs, and all were subordinated to the architecture, which was in no way depreciated—indeed, rather increased in value by Mr. Westlake's admirable work.

MR. W. B. RICHMOND, A.R.A., in reply, said there seemed to be a sort of sense of irritation between painters and architects, and he thought the architects were in an extremely difficult position. They were expected to be sanitary engineers, conversant with all matters of construction, and also to know all about the delicate arrangements and minute tints of colour; in fact, each one to be a Luca della Robbia, or a Phidias. He thought it would be better for each one of them to try to be an Ictinus. Phidias and Ictinus had each known the principles of his respective art, and they worked in sympathy. All architects and painters should do the same, remembering that life was not long enough for the one to understand all the mysteries of colour, or the other all the mysteries of architecture.

\* \* Consult, in connection with the subject of the foregoing Papers, *The R.I.B.A. Journal*, Vol. VII. N.S., 1891, for articles on "Fresco Painting as practised in Jeypore, Rajputana," by Colonel Jacob, C.I.E., *Hon. Associate*, p. 207; on "The Day's Work of a Florentine Frescoist," by Professor G. Baldwin Brown, M.A., *Hon. Associate*, p. 305; and on "Fresco Painting: Some Experiences in Monte "Video," by Alex. K. Mackinnon, *Fellow*, p. 329.

#### VIOLLET-LE-DUC ON PAINTING APPLIED TO ARCHITECTURE.\*

THE farther we go back towards the ages of antiquity, the more clearly we recognise the close alliance that existed between architecture and pictorial art. All the buildings of India, of Asia Minor, of Egypt, and of Greece were covered with painting, both within and without. Doric architecture—that of Attica, of Greater Greece and of Etruria—was enriched with pictorial decoration. The Romans seem to have been the first who, under the Empire, raised monuments of white marble or of stone unadorned by the painter's brush. The barbarian populations of Northern and Eastern Europe painted their wooden houses and temples, and the Scandinavians lavished gilding and brilliant colours on the interior of their dwellings.

Pictorial art as applied to architecture can only operate in two ways—either it is subject to the lines, forms, and arrangement of the structure, or, disregarding them, it displays itself independently over walls, ceilings, piers, and mouldings (*profils*).

In the first case, it forms an essential part of architecture; in the second, it becomes mere furniture decoration (if we may be allowed the expression), which has its own laws and often destroys the architectonic effect, and substitutes for it an effect belonging solely to the painter's art. It is not surprising that painters should look upon the latter species of pictorial decoration as the only good one, but it is questionable whether art would gain anything by it. It is only recently—that is, at the period of the Renaissance—that painting divorced itself from architecture. From the day when an isolated picture, or painting, made in the painter's studio, was substituted for painting applied to the wall which was to preserve it, architectonic painting became a lost art. The painter and the architect, working independently, daily deepened the abyss which separated them; and when by accident they tried to join issue again on a common ground, it was found that they no longer understood each other, and that, wishing to act in concert, no bond of reunion remained to them. The painter accused the architect of not having reserved suitable spaces for him, and the architect considered himself entitled

\* Englished from the Article "PEINTURE" in the *Dictionnaire Raisonné de l'Architecture Française du XI<sup>e</sup> au XVI<sup>e</sup> Siècle*. 8o. Paris, 1864. Vol. vii. p. 56.

to complain that the painter altogether disregarded his architectonic arrangements. This separation of two formerly-allied arts is most obvious, when we observe the attempts to reconcile them which have been made in the present day. It is evident that in these attempts the architect neither perceived nor understood the effect which painting ought to produce on the surfaces he had prepared for it, and that the painter looked on these surfaces merely as a canvas stretched out in a studio less convenient than his own, and troubled himself very little about the surroundings of his picture. This was not how decorative painting was regarded in the Middle Ages, nor even during the period of the Renaissance; and Michelangelo when painting the ceiling of the Sistine Chapel did not isolate himself, but was perfectly conscious of the place and environment in which he worked, and of the effect which he wished to produce. It does not follow because an artist works on a wall instead of on a canvas that he has achieved a monumental painting; and, despite their diversity of execution, almost all the mural paintings of the present day are merely isolated pictures. We perceive, too, that all these pictures demand a frame, that they are grouped in scenes, each of which has its own particular point of view and perspective, and that they unfold themselves in processions between two horizontal lines. It was not thus that the great artists in mosaic and the Western painters of the Middle Ages went to work. As for decorative painting of the present day, accident, instinct, imitation, serve as its only guide, and nine times out of ten it would be difficult to say why any given ornament assumes a certain form, or why it is red, or blue; or the artist possesses what is called *taste*, and that is sufficient, it is thought, for decorating the interior of a vessel with illuminations; or he collects pictorial fragments and applies them indifferently—one which formerly decorated a column he places on a flat surface, or another which adorned a spandrel he puts on a sub-basement. The public, shocked at these medleys, finds their effect anything but agreeable, but is gravely informed that mediæval decorators have been consulted and scrupulously followed, whence this same public concludes that mediæval decorators were barbarians—a privilege, be it said, which it willingly concedes to them.

It is true, we must admit, that painting plays the most difficult part in the decoration of architecture, and that it requires the most experience and calculation. When the interiors of all edifices, the poorest as well as the most magnificent, received pictorial decoration, there necessarily existed data and traditional rules, so that the most ordinary artists could not go far wrong. But at the present day these rules are entirely lost; each artist seeks an unknown law, and it is not to be wondered at that their attempts have, for the most part, produced unsatisfactory results.

The art of architectonic painting attained its apogee in France in the twelfth century. The stained windows, the manuscript vignettes, and the fragments of mural paintings of the period display very high art, a perfect understanding of tonic harmony, and coincidence of such harmony with architectural forms. There is no doubt that this art, so successfully cultivated in the cloister, was of Græco-Byzantine origin. At that time the finest stuffs and furniture, coloured utensils, and even a great number of manuscripts, brought back from the East, were shut up in the treasure-chambers and libraries of the monasteries, and served as models to the monks who devoted themselves to artistic work. Later, towards the end of the twelfth century, when architecture became no longer the exclusive province of the monasteries, and was practised by the laity, there was a revolution in pictorial art, which, though not so radical as that effected in architecture, still greatly modified the principles laid down by the monastic school.

Without touching at any length on the fragments of almost invisible painting, of shapeless lineaments which appear on certain monuments before the eleventh century, we merely mention that in the Gallo-Roman period, that is to say, in the fourth century, all the monuments seem to have been pictorially decorated, both in the interior and externally. This decoration was applied either on the bare stone or on a coating of colour spread over the masonry of the walls, and consisted on the parts raised above the ground-floor of a sort of white, or yellowish-white, *badigeon*, on which very light, delicate designs were traced in red or black ochre. Deeper colours were laid on near the ground: red browns, and even black, relieved by yellow-green or white strokes. The sculptures themselves were covered with a thin layer of this *badigeon* (a solution of chalk, ochre, and finely-ground freestone); the ornamentation stood out from a red background, the effect of which was often heightened by black and yellow strokes and touches. This style of pictorial decoration seems to have been practised in Gaul up to the time when Charlemagne brought artists from Italy and the East to his court. This, however, was not the only foreign influence that conduced to the development of monumental



painting as we find it in the twelfth century. The Saxons and Normans covered their houses, utensils, arms, and barks with pictorial decorations, and there are to be seen in the British Museum vignettes of Saxon MSS. of the eleventh century, which in drawing, in delicacy of execution, and in harmony of colouring are of extraordinary beauty.

This art evidently came from Northern India, the cradle of all those nations which understood how to harmonise colours. . . . But, in the first place, it is necessary to come to an understanding as to what really constitutes the art of painting as applied to architecture. In our times there has prevailed such utter confusion in all questions of art that it is well to lay down some first principles. What is understood by a nation of *colourists* (to use a time-honoured, though sorry expression), such, for instance, as the Venetians or the Flemings, by no means implies that they were *colourists* after the fashion of the inhabitants of Tibet, or of the Hindus, the Chinese, the Japanese, the Persians, or even the Egyptians of antiquity. To obtain a striking effect in a painting by means of cleverly-managed concessions, by the exaggeration of certain natural tints, and by a delicate appreciation of half tones, as a Titian, a Rembrandt, or a Metzu could do, and to produce a Tibetan shawl, are two perfectly distinct mental operations. We have had but a single Titian, a single Rembrandt, a single Metzu, whereas every weaver in India knows how to make woollen scarfs which, without exception, offer a harmonious combination of colours. For the production of a Titian, or a Rembrandt, it is necessary that there should be a social environment in a high state of civilisation; but the most ignorant Tibetan living in a wooden cabin, in the midst of a family as wretched as himself, will weave a shawl whose harmonious colouring charms the eye, and can be only imperfectly imitated in our best-managed factories. Therefore, from our point of view, the more or less uncivilised state of a people is not an obstacle to the development of a certain part of painting as applied to monumental decoration. But we must not conclude that because a nation is highly civilised it cannot attain to or regain this monumental art, in proof whereof take the Moors of Spain, a highly civilised race, which produced excellent models of architectural painting. Nor must we suppose that, because the painter's art as it has been understood since the period of the Renaissance has reached a high degree of perfection, we cannot at the same time possess architectonic painting, as may be seen by the Venetians of the fifteenth and sixteenth centuries. The conclusion to be drawn from the preceding observations is that the art of the picture-painter and the art of painting as applied to architecture proceed on different lines, and that to try to mix these two arts is to attempt the impossible. A few words will suffice to demonstrate the impossibility. What, we will ask, is a picture? It is a scene which is presented to the spectator in a fitting frame as if through an open window. It must have unity of point of view, of direction, of light, and of effect. In order to obtain a good view of a painting, there is but one single point placed on the perpendicular line raised from the horizontal point, or point of sight. It is painful for any well-trained eye to look at a painting otherwise than under this unique condition; just as it is a torture to find oneself before a theatrical decoration extending above and below the point of sight. Many people, we admit, suffer this torture without being aware of it; but it is not through the medium of the coarse senses of the unthinking multitude that we can establish rules of art.

Setting out, then, from this rigorous condition, we cannot understand a picture (that is to say, a scene represented according to the rules of perspective, of light, and of effect) placed in such a manner that the spectator finds himself four or five *mètres* below his horizon, and far from the point of view on the right and left. The brilliant periods of art never permitted these enormities: either the painters (as in the Middle Ages) in the subjects they delineated at different elevations on the walls paid no attention to the horizon, to the picture plane, to the perspective effect, and to the exact light; or else (as in the sixteenth and seventeenth centuries) they resolutely confronted the difficulty by tracing the scenes they wished to depict on a wall or on the ceiling of an apartment, according to a unique perspective which supposed that all the objects and personages shown to the spectator were really placed where they were represented, and consequently displayed themselves under an aspect determined by their actual position. Thus, in the ceilings of this period we view the personages upwards from the sole of the foot, while other figures look down on us with their knees drawn up to and hiding their breast. Naturally this mode of optical illusion met with great success. It is evident, however, that if, in this style of monumental decoration, the horizon is supposed to be placed at more than six feet above the ground, at the real height of the spectator's eye there can be only one single point of view for the whole horizontal surface supposed to be at six feet from the pavement. From the moment,

therefore, that one deviates from this single point, the perspective of the whole decoration becomes false, all the lines seem to waver and cause a sort of vertigo to people who have accustomed themselves to get an exact impression of the objects they behold. When art begins to fall into these errors and to seek to overstep its prescribed limits, it soon ceases to exist. It is the perilous leap which replaces eloquence, the juggler who takes the place of the orator. Still, the artists who adopted this style of decorative painting were able to admit one single point from which the spectator could, they thought, experience complete satisfaction. It was not much on the surface of an apartment to give one single point from which the decoration could be seen in its proper light, but still it was something. Moreover, the scenes represented were framed by the surrounding ornamentation, which of itself simulated the reality of relief, of light and shade playing on prominent bodies. It was a decorative system possessing unity and a *raison d'être*, but it would be difficult to find a reason for that species of art which, side by side with scenes affecting reality of effect, of light and shade, and of perspective, places flat ornaments composed of juxtaposed colours. Then the scenes which admit the effect of reality produced by relief and differences of planes are completely in dissonance from this flat ornamentation. It was, therefore, not without reason that mediæval painters saw in pictorial art, whether it represented scenes or was composed of flat ornamentations, a surface which must always appear level and solid, and which was intended not to produce an illusion, but a harmony. We admit that we prefer the painting in optical illusion of the vaulted ceiling of the *Grands Jésuites*, at Rome, to that of the ceiling of Saint-Savin, near Poitiers. But what we cannot admit is that any one should pretend to conciliate these two opposite principles. One must choose one or the other.

Not only were architecture and pictorial art closely allied in the Middle Ages, but figure painting and that of ornament formed but one and the same decorative glazing. The same mind conceived the composition of the scene and of the ornamentation, the same hand designed and coloured both, and, therefore, monumental decorations could not have the appearance of pictures painted on tinted paper, as is so often the case at the present day in what are called mural paintings, which are, in fact, merely pictures pasted on a wall in a frame which, instead of isolating them as the common gilt frame does, injures and effaces them, reduces them to mere dark or light smudges, spoils the effect, and preoccupies and displeases the eye of the spectator. When the painting of scenes on the walls of an edifice is not treated as the ornamentation itself, then it is of necessity effaced, and, so to say, killed by the latter. The ornamentation must either be treated on the optical illusion principle, if the subject enters into the domain of reality, or the subject must be treated as an illuminated design if the ornamentation is flat.

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We said that the Greek painters were the first masters of our Western artists, but in Greece (we speak of Byzantine Greece) painting preserved a hieratic form, from which in France it soon emancipated itself. As early as the thirteenth century, Guillaume Durand, Bishop of Mende, wrote in his *Rationale divinatorum officiorum*, quoting a passage from Horace, "Diversæ historiæ tam Novi quam Veteris Testamenti pro voluntate pictorum depinguntur; nam

'. . . pictoribus atque poetis

Quidlibet audendi semper fuit æqua potestas.'"

This homage rendered to the license which should be allowed to the artist, forms a strange contrast to the rigorous traditions of the Byzantine school, which have been kept almost intact up to the present day. In the style as well as in the execution and processes of the paintings produced in France during the eleventh and twelfth centuries we recognise the teaching of Denis, the author of the *Guide de la Peinture*. We meet again with the recipes of this Greek master of the eleventh century in the treatise of the monk Theophilus (twelfth century), and again in a work by the Italian painter Cennino Cennini, who lived in the fourteenth century; but if the mediæval artists long preserved the processes furnished by the Byzantine school, they quickly freed themselves from hieratic traditions and sought their inspiration in the observation of nature. Nevertheless, it is noteworthy that while giving a less and less traditional character to the style of their works, our artists of the West, and more especially of France, knew how to preserve decorative harmony in their paintings till towards the middle of the fifteenth century, by maintaining the principle of lightly modelled and illuminated designs. Our French artists in everything relating to drawing, to correctness of gesture, of composition, of expression, emancipated themselves sooner than the Italian masters; the paintings and manuscript



vignettes which are still extant of the twelfth century prove this, and fifty years before Giotto's time we had in France painters who had effected the improvements in art which are attributed to the pupil Cimabue. Between the end of the twelfth and the fifteenth century drawing underwent some modifications. Bound down at first to Byzantine traditions, it soon rejected the conventional data of that school, and sought the principles that are based on the observation of nature, without, however, abandoning the Byzantine style. The modelling, without attaining what was understood by *effect*, set itself to mark the planes. We recognise remarkable efforts of composition in the second half of the thirteenth century. The dramatic idea made itself felt, the scenes sometimes displayed movement and powerful energy. Towards the middle of the fourteenth century the drawing, already fine and delicate, began to have a tendency to mannerism; admitted types became lost and were replaced by the imitation of individual nature. The exaggeration of this style became obvious at the beginning of the fifteenth century, to such a degree that the study of the ugly was introduced into the art of painting, and soon invaded all its forms. At the same time we recognise that there is great manual dexterity, that the artists possess excellent processes, and that they carry to excess research of detail, minuteness in execution, in the study of accessories.

Colouring underwent less rapid transitions. The harmony of monumental painting was still subject to an essentially decorative principle; this harmony, it is true, changed its tonality, but it remained a harmony applicable both to subjects and ornaments. Thus in the twelfth century this harmony was absolutely that of the Greek paintings, which all had very light backgrounds. Both in figure paintings and for ornamentation local tone, which is colour, replaced what we call half-tints. The high lights on all prominent parts were light, almost white; the modelling was brown of an equal depth on all shades, the fine touches were either light on dark expanses of colour, or brown on light expanses, so as to avoid patchiness of general effect. The colours were broken, never absolute—at least not on large surfaces—and black was sometimes used as a high light. Gold was admitted as an embroidery or for brilliant points of colour, nimbi, &c., but never, or very rarely, as a background. The dominant colours were yellow ochre, light red, brown, and green of different shades; the secondary colours were a roseate purple, a light violet purple, and light blue. A brown line was always interposed between each colour. Indeed, we rarely find in the harmony of twelfth-century paintings two colours of equal depth placed side by side without another colour of lighter tone between them. Thus, for instance, between a brownish red and a green of equal depth there would be a yellow or a very light blue; between a blue and a green of equal intensity there would be a light roseate purple. The general aspect was pleasing, with no hardness of tone, and with very vivid *fermetés* obtained by brown lines and white high lights. Towards the middle of the thirteenth century the tonality changed. The primary colours, especially red and blue, prevailed. Green was only used to make other colours blend well; the background became sombre, showing brownish reds, very dark blues, sometimes black and occasionally gold, which was always goffered. White was rarely seen, except for the high lights; yellow ochre was only used for accessories, the modelling blended with and melted into the local colouring. The different shades were always separated by very dark brown or black lines. Gold appeared *en masse* on the garments, but it was always goffered or relieved by brown strokes. The flesh tints were light. The general aspect was warm, brilliant, and equally sustained, even sombre where not relieved by gold. Towards the end of the thirteenth century the tones became harder, the backgrounds were often black, sometimes very deep blue, or brown-red deepened by black. The garments, on the other hand, assumed lighter tints: pink, light green, roseate yellow, grey blue, and greenish white, covered the draperies. These were sometimes party-coloured—white, for instance—with transverse bands of red embroidered with white, black, or gold. The flesh tints were nearly white. In the fourteenth century grey, greenish-grey, light green, and light pink shades prevailed; blue was always modified, or if pure, then very light and only as a background. Gold was rarely used. Black or brown-red, or yellow ochre backgrounds, still predominated; the drawing was strongly traced in brown, and the modelling excellent. White, high lights were no more seen, but black or brown ones were frequent. The flesh tints were very light, the general aspect cold. Drawing prevailed over colour. It seemed as if the painter feared to diminish its importance by the apposition of too brilliant colours. Towards the latter half of the fourteenth century backgrounds presented varied colours like a mosaic, or a damaskeening of different tints. The draperies and the flesh tints remained light; black disappeared from the backgrounds, and was only employed for retouching outlines; gold mingled in the mosaic of the backgrounds, and the

accessories were light, often *en grisaille*, relieved by bright colours and gold ornaments. The general aspect was soft and brilliant, the colours much divided, while in the fifteenth century they appeared in large, warm, intense patches. The modelling was very good, although the direction and the light were not very decided. The prominent portions were lightest, and that holds with the method employed in decorative painting. But in the backgrounds the accessories—trees, palaces, buildings, &c.—were already treated in a more realistic manner. The linear perspective was sometimes carefully followed. As for the aerial perspective, it was not yet thought of. Stuffs were very dexterously imitated, the flesh tints very delicately modelled, gold appeared everywhere on the garments, in the hair, in the details of the accessories; and we do not see those sacrifices which are rightly considered necessary in picture painting. The most insignificant accessory was painted with as much care and put in as good a light as the principal personage. This is one of the conditions of monumental painting. On the walls of an apartment, which are always seen obliquely, what the eye demands is a general, sustained harmony, a surface equally rich, equally solid, with no vistas, no planes dissimulated by sacrificed tones which disturb the proportions and parts of the architecture. Having established these general principles, we pass on to the study of subject-painting and of the processes used in it.

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The painters of the twelfth century practised their art by diverse methods. There was fresco-painting, also painting *à la colle*, painting *à l'œuf*, and painting in oils. The last, for want of a siccative, was, however, only used for small works—for panel pictures which could be easily exposed to the sun. For fresco-painting—that is to say, on a coat of fresh mortar—the artist, as we have just said, began by tracing in red ochre (soaked in pure water) the masses of his composition; then he laid on the local colouring which formed the half-tints, in a succession of layers, each of which received an admixture of lime; he modelled the prominent parts, adding a larger quantity of lime as he reached the last layers; then he retouched all the outlines, folds, depressions, and the inner lines of the nude parts and draperies, with red-brown strokes mixed with black.

This operation had to be rapidly performed, so as not to let the plaster and the first coatings of paint get quite dry. This mode of painting, *dans la pâte*, gave a softened brilliance peculiar to this species of work, and a modelling which, from an intense blue, for instance, rose by a gradation of tints to be nearly white on prominent parts, was neither hard nor crude, since each successive tone sank into and blended with the preceding one. The ability of the worker consisted in knowing exactly what degree of dryness to allow to each successive layer, before applying the next. If one layer was too moist, its successor ran into it and formed a heavy, dull, mixed discolouration; if it was too dry, it would not blend with it, but formed a dark ring round all its contours. The black-brown strokes so necessary to mark the profiles, the interior forms, the shadows, folds, &c., were often traced after the successive layers were dry, and by this means obtained greater brightness and clearness. It was then sized with egg or with gum (*colle de peau*). Thus it is that in ancient frescoes we often see this brown glaze peeling off in scales, and by no means incorporated with the plaster.

The use of lime in the composition of each coating of paint imposed on the painter the necessity of using only certain colours, such as the earthy pigments, and blue and green cobalt. This necessity of using only earthy pigments, and a small number of mineral colours, contributed to give these paintings a soft, velvety harmony. In the thirteenth century this harmony appeared too pale compared with the vivid tints of the stained-glass windows, so fresco-painting had to be abandoned in order to enable the artist to use oxides of lead, copper-greens, and even the different lakes. Moreover, the architecture of that date did not lend itself to the use of coatings (*enduits*); it therefore became necessary to find a process of painting that would facilitate the immediate application of the colour on the stone. A variety of processes were in use. The commonest of these was painting *à l'œuf*, a sort of light, durable distemper; painting *à la colle de peau*, or *à la colle d'os*; both equally durable when not exposed to the influence of humidity. The most durable was painting by means of a preparation of rosin dissolved in alcohol, but this somewhat expensive process was only used in very delicate work. Sometimes they contented themselves with a mere whitewash applied as a ground, on which they painted in water-colours before the layer of lime applied with a brush was dry. Oil-painting, very clearly described by the monk Theophilus and adopted before his time, since he makes no claim to having invented it, was only used, as we have already said, on panels, because of the time it took to let each successive coating of paint dry in the sun, siccatives not being yet in use.



Painting *à la gomme*, in use in the twelfth century, seems to have been frequently employed by painters of the thirteenth century for small objects, such as altar-screens, woodwork, &c. "If you wish to accelerate your work," says Theophilus, "take some of the gum which exudes from cherry-trees or apple-trees, place it in an earthenware vessel, pour in plenty of water, then expose it to the sun; or, if in winter, to a slow fire till the gum dissolves. Stir it up carefully with a stick, and pass it through linen; grind your colours with this preparation and apply them. All the colours and their compounds can be ground and laid on by means of this gum, except red and white lead and carmine, which must be ground and applied with white of egg." These paintings in gum and even in oil were always covered with a varnish composed of gum-arabic, dissolved by boiling in linseed-oil, which imparted great brilliancy to them.

The artists of the thirteenth century, when painting subjects in apartments lighted by stained-glass windows, aimed at giving them brilliant and durable colouring superior to that of decorative painting, and which could hold its own against the gold so frequently used at that period. To obtain this brilliancy of colour they had to use glazing, and, in fact, the colouring of the figures, when the latter were painted with any degree of care, was obtained by applying transparent colours on a preparation *en camaïeux très modelés*. These artists, whether from tradition or by instinct, had a true appreciation of harmony (their painted windows are sufficient proof of this); but, from the moment that gold entered into the decoration of large surfaces, it became necessary to modify the soft, clear harmonies of the painters of the twelfth century. Gold is a metal and not a colour, and its presence *en masse* forced the artist to change the whole range of his colours. Gold has very bright, vivid reflections, half-tints, and shadows of an intensity beside which every other colour if light becomes grey, if dark looks dull and heavy. In order to struggle successfully against the vivid lights and warm half-tones of gold, it was necessary to have very bright tints, which, however, if they were not to appear black, had to preserve almost the transparency of water colours. It is thus that the small subjects which decorated the arcades of the Sainte Chapelle haute du Palais, at Paris, were treated. These subjects, which stood out on a background of glass of alternate gilt damaskeening and goffered gold with dark lines, were painted in light colours, and then heightened by very bright transparent colouring and brown lines. However, in juxtaposition to gold all colours were not treated in the same manner; the blues and light greens (turquoise greens) were in impasto, and thus applied they gained great richness and depth of colouring; reds on the other hand, to be able to support the contrast with the gold, had to be laid on as a glazing; so, too, had dark greens, purples, and yellows. These glazings seem to have been held together with a resinous gluten, or, perhaps, only by a varnish of linseed-oil and gum-arabic. As for the impasto-painting, it is very delicate, and is applied on a very thin ground of lime. It is not, however, a fresco, for it scales off and forms a glazing.

It was not unusual for artists when painting subjects or ornaments on a gold ground (*fond*) to gild the under parts of ornaments or draperies intended to be painted red, purple, or bronze-yellow. Then the colouring was but a very transparent glaze applied to the metal, and heaviness was avoided by deep, intense tones. These tones participated in their *fond* and preserved something of its metallic brilliancy.

The expense of paintings in which gold played an important part, the difficulties which, in consequence of the use of this metal, hampered the painter at every step, if he wished to preserve a brilliant and sustained harmony without falling into heaviness, caused artists towards the thirteenth century to have recourse to *grisailles*. The painting of glass windows had been carried to such a pitch, the overwhelming vividness of its colouring had forced subject-painters to give such brightness and intensity to their tints, that they had to retrace their steps and pursue other methods. Many painted windows were then made *en grisaille*, and the translucent colouring was of a lighter tone; gold henceforth played only a very secondary part, and the subjects were painted in soft light colours so as to avoid the flat insipid effect of faintly illuminated *camaïeux*. They were thrown up by violent backgrounds of black, brown-red, or intense blue, overlaid with varied designs, or with damaskeening of various colours. Perspective backgrounds were scarcely thought of as yet, but artists began to give a realistic appearance to accessories, such as seats, tables, &c. By degrees the field of imitation grew wider. At first the artist only painted, according to their proper form and dimension, the objects in immediate contact with his figures; next he introduced a building, a door, a tree, on a secondary plane; then, finally, purely decorative and conventional backgrounds disappeared, and gave place to

a realistic interpretation of the place in which the scene unfolded itself. We must own, however, that whenever painters, earlier than the sixteenth century, sought to give a realistic representation of the place (*lieu*), they, as we have already said, never thought of the aerial perspective, nor of the *effect*,—that is to say, of the distributions of light on one principal point,—nor of producing an illusion; and their paintings always preserved the appearance of a flat decorated surface, which is, we think, one of the essential conditions of monumental painting.

Moreover, of all the arts connected with architecture, decorative painting is the most difficult of application, because its laws are essentially variable as regards both place and object. Decorative painting enlarges or diminishes a building, renders it light or dark, disturbs its proportions or improves them, makes them seem nearer or farther off, dissimulates faults or exaggerates them. It is a fairy which distributes good and evil, but never remains indifferent. At its own pleasure it magnifies or lessens the circumferences of columns, lengthens or shortens pillars, elevates the vaulted ceilings or brings them nearer to the eye, extends surfaces or makes them smaller, charms or offends, concentrates the thoughts upon an impression, or distracts and preoccupies it. With a stroke of the brush it destroys a well-conceived work; but again, it makes of a humble edifice a place full of charm; of a cold, bare apartment a pleasing abode, in which one loves to dream, and of which one keeps an ineffaceable memory.

To effect these prodigies of mediæval times was it necessary to have excellent masters, great artists, such as each century produces by ones and twos? No, indeed; it needed but a few working painters proceeding on principles derived from a long observation of the effects produced by the assemblage of colours and the scale of ornaments. Then the poorest village church daubed with lime became, with a few touches of painting, a work of art, the same as the Sainte Chapelle. And we did not see in the midst of the same civilisation works of art of great value, or at least of surprising richness, and a few steps farther off those wretched decorative paintings which dishonour the walls they cover, and make people of taste blush as they look at them.

There are, as every one knows, three colours—yellow, red, and blue—black and white being negatives; white is light without colour, and black the absence of light. From these three colours all tints, that is to say, infinite *mêlanges*, are derived. Yellow and blue produce greens, red and blue purples, red and yellow different shades of orange. The presence of white or black in the midst of these diverse mixtures adds to the light or impairs it. Precisely because black and white are negatives, alien to all colours, their province in decoration is to bring out value. White radiates, black throws up the radiation and limits it. Decorative painters of the Middle Ages, whether from instinct or tradition, never laid on their colours without heightening effects with black and white, sometimes with both. Going from the simple to the composite we will proceed to explain their methods. We are speaking now of the painting of interiors lighted by a diffused light; we will turn our attention afterwards to painting of exteriors which receive a direct light. During the Middle Ages, in which monumental painting played such an important part, we observe that the artist from the first adopted a certain tonality from which he never deviated on any one given surface. Now these tonalities are not numerous and may be reduced to three—the tonality obtained by yellow and red with dark or light, *i.e.* with the items of black or white added; the tonality obtained by yellow, red, and blue, which, perforce, entailed intermediate tones, that is to say, green, purple, and orange, always with touchings up of black and white, or black only; and the tonality obtained by help of all the tones given by the three colours, but with gold and black touches,—the luminous reflections of the gold in this case replacing the white touches.

. . . Colours not only have an absolute value, but also a relative value determined by the position they occupy and the extent they cover; again they are modified by the form of the ornament they cover, and by the real extent of the surfaces. In the simplest tonality, that in which yellow (ochre) and red (ochre) are employed, it is evident that one of these colours, the red ochre, has greater intensity than the yellow ochre; but if to these two colours we add blue, the value of the red and the blue must be different: the red must give way to the blue, or what is more natural, the blue to the red. Then we must admit red-brown and light blue; if we (almost perforce) add the compounds of these three colours, such as green and purple, we must arrange that they shall be of different values,



that is to say, no two tones must be of equal value. The question here is not of surface, but of intensity, and this intensity is optional. If, when we only use three colours, the red must be a brown-red of great intensity, when we join to these colours their compounds, the red must become primary again, that is to say, vermilion, because the brown-red would not harmonise either with the green or the purple; the adjunction of derived tones makes it necessary that the colours, if used, shall be in their primary form. However, it is well that the first value should be left to a colour rather than to a tone, and as this first value cannot be given to yellow, it will be taken by the red (vermilion), or by the blue (generally the blue). Suppose that it is very dark blue which has the first value, the painters of the Middle Ages took care not to give the second value to another colour, that is to say, to red (vermilion), but to a tone, more frequently to green, sometimes to purple. Then came the third value, which would be red (vermilion); then between this colour and yellow there would come another tone, generally purple, sometimes green. After yellow came inferior values, very light purples, light blues, turquoise greens, straw colour, milk white, and grey. For below the colour of the lowest value, namely, yellow ochre, there were obliged to be lighter tones; the range of values or depths never ended with a colour, just as it rarely began with a shade or tone. These principles conceded, there still remained a quantity of rules of secondary importance, which the artists of the Middle Ages scrupulously observed. We will mention some of them. Deep blue being hard and cold, the painters made it a little green, relieving it by dashes of gold, and they almost always joined to it a deep red vermilion; then, after the red, a light green or even a bluish or greenish white; black lines moreover separated each tone and each colour. Blue in contact with yellow produces a displeasing effect, so red or purple was interposed. Nothing but a slaty, grey-blue can blend well with a yellow surface. Green was often placed in direct contact with blue, and it was a dissonance which they turned to excellent account, but then, it was always a yellowish or a bluish green, never a true green; if green was laid on in contact with yellow, the latter colour was orange, and the green was light, or the yellow was light and the green dark. The purples which as a surface have the value 5, and which consequently ought to occupy the smallest field in pictorial decoration, never approached to violet, that false tone being entirely excluded; it rather took to orange and red reflections. We have often observed how ingenious nature is in the harmonious combination of the shades of plants: thus, out of ten geraniums or ten hollyhocks, which have flowers of different reds and purples, we shall see ten different shades of green to suit the different reds and purples of the flowers they surround. Had the mediæval painters studied the secrets of tonic harmony from nature? But how is it that they have been lost, or that women only possess them in matters of the toilette? Why is it that if they have to paint an apartment, our artists seem to lay on the tones and colours at haphazard, producing almost always a discordant effect? Is it a fault of principle, of tradition, or of practice? It is certain that, in the important art of pictorial decoration, instinct alone will not suffice, as some think it can; and that in this important adjunct of architecture, reasoning and calculation must be brought into play, in default of a long series of traditions.

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The decorative painters of the Middle Ages developed to its utmost limits this knowledge of the value of shades, of their influence and harmony; and if the decorative attempts of our day have not succeeded, we must not lay the blame on mediæval artists, but on our own almost complete ignorance in these matters. The harmonic system (simple for all vertical parts near the eye, and composite for the ceilings) employed in the decoration of the Church of the Jacobins at Agen, establishes a transition which it is extremely interesting to observe. The decorators of this apartment used blue niggardly, and yet, while using it only over small surfaces, they at once admitted purple, green, and threads of black. They admitted only two shades of blue: dark blue (of indigo depth, but of a warmer hue) and a very light blue (cobalt, mixed with white). As for their purple, it is brilliant, like what one would obtain with a glazing of red lake, and a smatch of mineral blue on a ground of light orange. The touches of green, which are rare, are bright and inclining to yellow. The red-browns are vivid, and have the depth of vermilion, but are more transparent. There is not a particle of gold, which is overwhelmed by the presence of blue on a large surface. As we said before, blue radiates more than any other colour, and its presence, to some extent, militates against every other shade: with blue red changes colour, yellow takes a greenish hue, and intermediate shades grow pale, or assume a hard appearance. Gold only, by its metallic reflections, can restore the harmony of tone when blue appears

on large surfaces. Gold, though it has a wide range of yellow tints, has the singular quality of not getting a greenish hue by contact with blue, and of its brightness remaining unimpaired. In the shade it takes warm tints which (in a previous passage) replaced the brown-red that we interposed between the yellow ochre and the blue. In the half-tints it took greenish reflections of great depth, which turned blue azure. In the light it scintillated and gained an *éclat*, which no other tone, however vivid, could impair. Gold thus becomes like a melody, which, standing out from its accompaniment of chords, is powerful enough to restore harmony to all tones, however discordant. It prevents the radiation of blue and azure to such a degree that without an admixture of yellow they would appear violet. It makes vermilion appear lighter against the warmth of its shadows; it imparts to green a brilliance it could not have against blue; it adds warmth to purple by means of its greenish reflections. It was not, therefore, merely a vulgar desire to give richness to a painted decoration that caused gold to be used in such large quantities in the thirteenth century, but a harmonic requirement imposed by the adoption of blue on large surfaces, a usage necessitated by the painted windows of the period. This question is worth looking into. In the twelfth century, as we have already seen, artists adopted a light, simple decoration composed of white, yellow, brown-red, greenish shades, greys, slate-greys, and grey-blacks. When they began to have painted windows of very vivid colouring, and the light thrown into the interiors was discomposed by the interposition of these windows, we perceive how all these light shades were obscured and deadened. The artists multiplied black lines in order to heighten the effect of their paintings, but under the radiation of these windows, black itself appeared grey. They put in blue touches, but the latter did not harmonise with the yellow ochres, and on small surfaces blue made a mere blot. Then they took heart of grace, and dared to cover their ceilings with a coating of blue—not a pale blue, as in some of the decorations of the Roman period, but a true, bright blue. It needed but a single trial of this style to show that this audacity must modify the whole harmonic system of decorative painting. In the first place, the blue ceilings lighted by the variegated rays of the painted windows assumed such an azure aspect that they appeared almost violet, of a dull, heavy tone, which nothing could resist. As a corrective to these blue ceilings, and in order to restore to the blue its true value, they tried the effect of red touches, but the reflection of the red on the blue was still worse. They next tried white stars, but these stars appeared grey. Then, at last, they applied gold stars, and the blue immediately regained its true value, and, instead of seeming to crush the building, it rose and assumed a transparent effect. Where these touches of gold caught the light their yellow metallic brilliance softened the tone of the blue, and where they remained in the shade their warm, yellow-brown tints made it seem still more blue. It then became possible to modify this blue without any inconvenience. This was done by a slight admixture of yellow, so as effectually to prevent a violet appearance. But this new point of departure, in intense, vivid tints, necessitated the modifying of the whole range of tones hitherto in use. In order to contrast with blue ceilings relieved by gold stars no colour was too brilliant, too intense. It was necessary, therefore, to admit vermilion, and even vermilion with a glazing of lake, bright greens, and transparent purples, and in the midst of all this to throw in gold, with all its glittering reflection, as a harmonious element. They even went so far as to apply to their backgrounds *plaques* of enamel, or of glass gilt so as to simulate enamel, or applications of gilded gold, or of glass bead-work. This was the description of colouring employed in the decoration of the Sainte Chapelle du Palais. No species of decoration is so captivating as painting. If you lay on over tones, you are obliged to lay on all the others to preserve the harmony. The first coat of colour you apply on any given part is a sort of engagement which you impose on yourself and which you must rigorously carry out, under pain of producing nothing but a repulsive daub. We have long turned gold to account when the harmony cannot be preserved in any other manner. Gold, however (if we may be permitted the expression), is a spice, and not a diet. To lavish it here, there, and everywhere, is perhaps a confession of weakness. There are paintings of great richness of colouring without there being a particle of gold in them. Gold is the almost necessary touching up of blue, but a brilliant effect may be produced without blue, and therefore without gold.

(Signed) E. E. VIOLETT-LE-DUC.



LXXXV.

SOME CHURCHES IN THE NEIGHBOURHOOD OF CLEVES.

By MR. H. W. BREWER.

Mr. J. Macvicar Anderson, *Vice-President*, in the Chair.

MR. VICE-PRESIDENT AND GENTLEMEN,—

THESE is, perhaps, no district in Germany which has received so little attention at the hands of the English archæologist and architect as the old Duchies of Cleves-Berg. Formerly they were two independent States of the German Empire; under Napoleon they were united, and at the present day they are annexed to Prussia. The best way of approaching this district from England is by Flushing, and then taking the train on direct to Cleves. But as I visited it from Cologne, I shall find it more convenient to describe the various places of interest as they occur in a route commencing from that city. I shall also take the opportunity of saying a few words upon the present condition of German architecture as exemplified by some works recently carried out in the city of Cologne; and I do so for this reason, that exactly twenty years ago I had the honour of reading a Paper before you upon the condition of architecture in Germany, in which I expressed the belief that German architecture had a great future before it, and signs were not wanting of considerable progress being made. The drawings which I then exhibited by some modern German architects seemed to warrant this, and the late Mr. Street and other eminent English architects who were then present were of opinion that I was justified in holding that view. I am now, however, bound to acknowledge that, judging from the modern street architecture of Cologne, the buildings, public offices, churches, and mansions which I had the opportunity of seeing, I found little or nothing which shows any advance either in Gothic architecture, in Renaissance, or in modern developments. For, while our architects in England have made great strides, especially in the adaptation of Gothic and Renaissance detail, I saw little in Germany which might not have been done equally well half a century back. The recent works executed at the Cathedral are, if anything, less satisfactory than those which were being carried out a quarter of a century ago. The best restoration in the town is that of Sancta Maria

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zu Capitol, which was completed some twelve or fifteen years back. The new street architecture seems to be singularly devoid of interest. This is most regrettable, because hundreds of fine mediæval Gothic and Renaissance houses, which offered excellent suggestions for modern street architecture, have been ruthlessly swept away to make room for the very poorest, dullest, and most commonplace "jerry-builder's" work. The one solitary exception that I came across was a new gallery and staircase at the Hôtel Disch, which is a pretty adaptation of the late German "rococo" style, with elegantly designed stucco-work and wrought-iron balustrades. The old walls of Cologne, which were of such interest to the antiquary from their Roman and mediæval remains, have disappeared, but the two old gateways, the Hahnen-thor and the Ehren-thor, have been spared. One must be thankful for small mercies.

The Germans are very proud of their "Brobdingnagian" steeples, but I think that every Englishman will regret that both those of Cologne and Ulm were not attached to modern buildings instead of ancient ones, as they destroy the scale of both of those churches, which did very well without these modern additions.

The first place that I wished to visit was the old Abbey of Altenberg; but, to my astonishment, it appeared to be rather less well known in Cologne than in England. After numerous inquiries, however, it turned out to be some sixteen miles distant, and about eight miles from any railway station. As I was with two friends, we determined upon going in a carriage, and we certainly never should have reached the place had we not done so, for a more wild, inaccessible region it is difficult to imagine. The first part of the drive is across a desert of yellow sand, with here and there an extremely uninteresting village with factory chimneys and modern churches. The latter are of brick, early Gothic or Romanesque; some of them have the merit of being very large. After some eight or nine miles of this dreary country one approaches a range of hills, the view from the top of which is most extraordinary; on one side the whole panorama of the lower Rhine, with the blue mountains of the Drachenfels, is visible, the numerous spires of the city of Cologne, the great winding river, and the vast plain which we had crossed forming the foreground. On the other we beheld range after range of hills covered with forests, separated by valleys through which rapid streams tear their way along, bounding over huge boulders and forming numerous cascades. How any horse managed to climb up and down these hills is a mystery to me! One can scarcely say that there were roads, because in one valley we drove along the bed of the river with the water up to the splash-board, and the boughs of the trees sweeping our hats off. A more beautiful neighbourhood it would be difficult to conceive. At length, after pursuing a long zigzag lane, we arrived at the top of a great hill, and our driver said, pointing with the butt of his whip, "There is Altenberg," and looking down through an opening amongst the trees, we saw, 200 feet below us, the long roof of a vast cruciform church.

Descending the hill by another zigzag road we drove over a mediæval bridge through a Renaissance gateway, and found ourselves opposite the west front of the church. I confess that my first feeling was one of disappointment. The west front



is a somewhat hard and dry example of German fourteenth-century work of the Cologne school. Upon closer examination, however, some good sculpture is to be found about the western doorway; this, and in fact the whole of the west front, is of a later date than the rest of the church.

Altenberg was a Cistercian abbey, and, in accordance with the rule of the Order, ornament is very sparsely used, both externally and internally. The cloisters, chapter-house, and refectory were burnt down about sixty years ago; but drawings which remain of them, and a few fragments strewn about the abbey yard, show that they were of rich Transition work.\* All that at present is left of what must once have been one of the most stately abbeys in Germany is the great church, the abbot's chapel, and a few uninteresting farm-buildings.

The resemblance which the abbey church bears to Cologne Cathedral is remarkable. In fact, the plan of the choir and transepts is identical (with the exception that Altenberg has one bay less in both). It has been called by some German writers the "Parent of Cologne," and has been set down as an earlier work of the architect of that vast church. In a Paper which I wrote for *The Builder*, about twelve months back, I gave reasons for discrediting this theory; here I will simply observe that although Altenberg looks the earlier church of the two, in point of fact it is not so, as the choir of Cologne was commenced in 1248 and consecrated in 1322, whereas Altenberg was not commenced till 1255, and Kugler gives the date of its completion as 1379. I fancy, however, that this latter date refers only to the west front, as there is not much change of style visible in the other parts of the church. The cylindrical columns and unglazed triforium seem rather to suggest that a Flemish influence was at work upon the design of Altenberg, and the whole thing has a more Northern treatment than has the cathedral of Cologne. I do not hesitate to express the opinion that, as far as the interior is concerned, Altenberg is a more beautiful church than Cologne, though it is seen to great disadvantage, as it is whitewashed from floor to ceiling, denuded of furniture, and looks singularly dreary and desolate; it is now used as what the Germans call a "Simultankirche," that is to say, it is used at different hours of the day by Catholics and Protestants, the Catholics numbering about a thousand, and the Protestants two hundred; the thousand Catholics must have to look about to discover each other in this vast building, and the two hundred Protestants must be altogether lost in some side chapel. Notwithstanding the look of emptiness and desolation which this church presents, its noble proportions and stately dimensions (I should think it is 400 feet long), and above all the exquisite glass with which all the windows are filled, make it well worthy of a visit. This glass is most interesting; it is entirely in grisaille, designed in superb geometrical patterns, intersecting and interlacing scrolls. The colours used seem to be chiefly a bluish grey, yellow, white, and green, and no drawing could give any idea of the exquisite effect of colour in this glass; it must certainly all

\* Drawings of the chapter-house and cloisters of Altenberg Abbey will be found in *The Study Book of Mediæval Architecture and Art*. By Thomas H. King. 4o. Lond. 1858. Vol. i., Plates 21 and 22. A drawing of the church, from the pen of Mr. Brewer, is given in *The Builder*, vol. lviii., p. 452.

have been designed and executed at the same time, and is treated purely as an ornamental filling-in to the windows, arranged in such a way as to be continuous throughout the whole building, the only break being the west window, which is later "figure-glass," and very inferior to the rest. It is impossible, after seeing the exquisite glass at Altenberg, not to be struck with the fact that the simplest material and quietest design are capable of producing extreme loveliness in art. There can be no doubt, I think, that the perfect harmony which prevails in this work, and which is the chief element of its beauty, is that it must have been designed by the architect who executed the tracery of the windows themselves; and I venture to think, if we had more of the architect and less of the painter in our modern glass, that spotty and unquiet look, which so often worries one's eyes, would be avoided, and possibly that unfortunate invention, the "memorial window," might be deprived of some of its objectionable qualities. Much has been said against the old-fashioned mural tablets with which our great-grandfathers covered the walls of their churches. They have been irreverently called "blisters," yet I doubt whether they ever injured the effect of a building as do these memorial windows. I cannot help also thinking that stained-glass windows form most inappropriate memorials to the dead. In the first place, the inscriptions on them are nearly illegible, and are of course quite so of a dark day or in the evening when the building is lighted up; and in the next place, if these windows are made to tell out as individual features, they generally ruin the effect of the building and everything in it, and if they do not, no one knows that some great, learned, or pious man is commemorated by one of a lot of very similar windows. Another injury which I think these memorial windows inflict upon art is that since their introduction our architects and sculptors are rarely called in to design monuments, and one of the very best opportunities of combining the work of the architect and the sculptor is thus lost. It is singular, moreover, how very good in design and execution the old monumental tablets were, even down to our own day. I must, however, return to Altenberg. As I have said, the place is almost denuded of furniture, yet the old altars remain. There is an exquisite tabernacle of late Gothic canopy-work, a good wrought-iron lever which probably supported a font-cover, and a grand series of monuments to the Counts of Berg and mitred abbots of Altenberg, but all in a very ruinous condition. The Lady chapel, moreover, is heaped up with fragments of old carving. There is a fine Flemish brass in the south transept, and rather a nice seventeenth-century iron screen across the nave.

I do not think I have ever seen any great church which impressed my mind with so much sadness as does this noble interior. I do not quite know why this is the case, but it seemed to me to be so terribly alone; perhaps it is mourning the loss of its monks, who were driven out by the French a century back. It forcibly recalls to one's mind those pathetic words of the prophet Jeremiah, "My tabernacle is spoiled, and all my cords are broken; my children are gone forth of me, and they are not." About a half-mile from the abbey is a picturesque fifteenth-century grange which belonged to the abbots, and on the opposite side of the stream is a Romanesque village church with a saddleback tower.



Leaving this beautiful region, and returning to the great sandy plain which extends in a northward direction to the Dutch frontier, the first place of interest which we come across is the very ancient town of Neuss. If the situation of Altenberg may be taken as an example of all that is charming, that of Neuss may be taken to represent everything that is uninteresting and unpleasant. A sluggish and muddy river here flows into the Rhine, and a malodorous ditch surrounds the picturesque remains of old fortifications and two rather striking-looking gates. There is not much to see in the town, except the great church of St. Quirinus, called "The Minster," a very noble example of twelfth-thirteenth-century architecture. Unlike Altenberg, no French or Flemish influence can be traced in its design; all is purely German, and perhaps a more thoroughly satisfactory example of late Romanesque and Transition work cannot be found in that country. The plan [fig. 135] shows a single eastern apse, with two others at right angles, all three opening from a crossing, which is crowned by an octagonal lantern. To the west of these is a nave with double aisles, vaulted in three quadripartite bays, which are below subdivided into six. The nave has double aisles, and a large square western tower flanked by transepts. The arrangement of the choir here is somewhat singular, and very suggestive. It occupies the eastern crossing, but, instead of the side apses being cut off by screens, as is usual, the stalls are placed against the walls of the two apses; the stalls themselves are fourteenth-century work, and certainly seem to me to be in their original position. A modern high altar with a hideous baldachino stands under the crossing, and from the position of the stalls I should think that this is the original situation of the high altar. The arrangement seems to me to be remarkably suggestive and worthy of being copied in our modern churches, because it solves a great difficulty, as it brings the choir into its proper relative position to the altar, without making the singers so very prominent. Below the eastern part of the church is a crypt, which is entered by a flight of steps going down from the nave, and is thus visible from the floor of the church. The treatment of the interior is somewhat uncommon; the aisles are very low, and the arches opening into them are supported on solid, heavy square piers. Above these is a singularly lofty triforium, finely vaulted, the openings into which are pointed, and subdivided into two lights. Above this again is an unusually lofty clerestory and somewhat acutely pointed vaulting. I do not know any Romanesque building in which the effect of loftiness has been striven after to such an extent as in this church, and the effect is certainly very striking. Externally the most beautiful portion of the church is the west end, with its transepts and noble tower. This work is dated 1209, and as the date occurs rather low down, we may, I think, take it as that of the commencement of the work, though there is perhaps more of the Romanesque element than we should have expected to find in a building\* of this date. I should mention that there is no old furniture in Neuss, except the stalls, which I have described.

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\* See *The Builder*, vol. lviii., p. 416, for a description and drawing of this west end.—H. W. B.

The next place which I visited was Emmerich, a very clean and handsome old town on the banks of the Rhine, quite Dutch in its characteristics. There are two old churches here; one called the "Old Minster," and the other the "New Minster."

The Old Minster, which, I think, is dedicated to St. Aldegonde, is, without exception, the most singularly planned church I have ever seen, and I can only describe it as a great north transept with a very small nave, a low chancel, and short south transept attached to it [fig. 136]. The building is of brick, with stone very sparsely used; and quite Flemish in character. The choir or chancel is Romanesque, perfectly devoid of ornament, and undoubtedly very early in the style, probably tenth-century work. The great transept to the north is, I fancy, fifteenth-century work, and attached to it is a striking brick steeple, and a porch on its eastern side, which formed, as far as I could find, the only entrance to this most singular church. The nave, which is only two bays long, is low and insignificant, and has been thoroughly modernised internally. For furniture there is a good early Renaissance brass font and a set of remarkably fine fifteenth-century choir-stalls, which were the first examples I had seen of the splendid church furniture which seems to

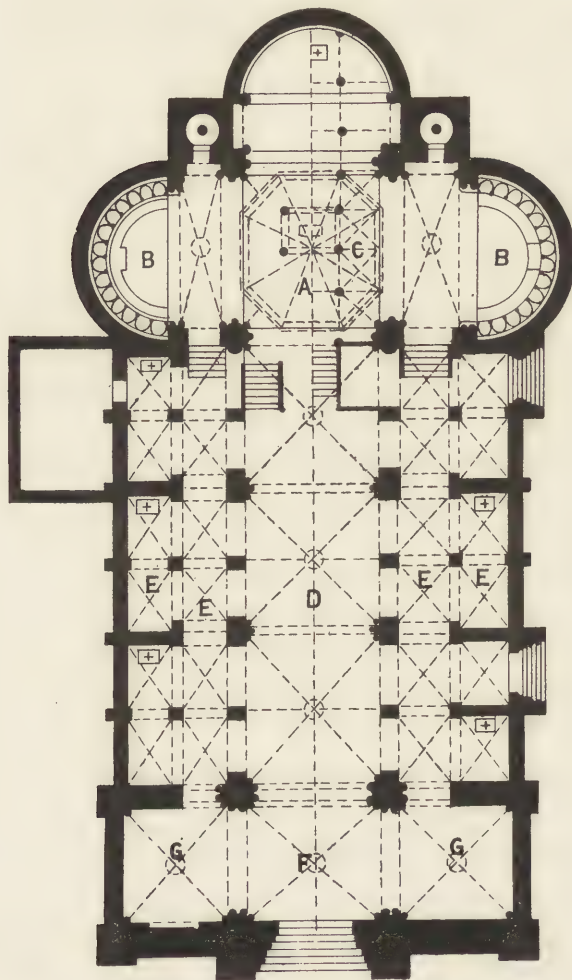


FIG. 135.\*—SKETCH-PLAN OF ST. QUIRINUS, NEUSS.  
A, Sanctuary, with Lantern above. B, B, Choir. C, Crypt. D, Nave.  
E, E, E, E, Aisles. F, Tower. G, G, Western Transepts.

abound in this neighbourhood. The other old church at Emmerich consists of a vast nave and aisles of the plainest fifteenth-century Gothic of the Dutch type, and a lofty brick tower crowned by a lantern. There is nothing interesting about it, either internally or externally, except its great size.

The beautiful wood-clad hills of Cleves come in sight directly one leaves Emmerich. It is a walk of some seven miles from one to the other. The first two

\* The *ground-plans* illustrating this Paper are only sketch-plans, for the purpose of explanation of the text, and must not be regarded as absolutely correct representations of the building.—H. W. B.



or three miles after leaving the Rhine-ferry is flat and uninteresting, but as soon as one gets well away from the Rhine, the roads are bordered with trees, and some pretty villages with mediæval churches are to be seen, the towers of which are generally Romanesque or "quasi-Romanesque." I say "quasi-Romanesque," because these Romanesque-looking church towers were built in Germany down to the end of the seventeenth century; the most striking examples I have come across are the three towers of the Abbey of St. Matthias of Trèves, and that of St. Emmeran at Ratisbon. Without carefully examining the detail of these buildings, one would be apt to ascribe them to the twelfth century, whereas in point of fact not a single stone was laid before the sixteenth century. I

scarcely know whether this may be regarded as a kind of revival of Romanesque when the Gothic was declining, or whether the Romanesque style lingered on in parts of Germany through the whole of the Middle Ages. There are not wanting indications of the latter. A fifteenth-century pilgrimage church at Eternach is a very peculiar mixture of Gothic and Romanesque work, and in the eastern parts of

Austria purely Romanesque churches are found with fourteenth and fifteenth-century dates upon them.

The first glimpse one has of Cleves is very refreshing and beautiful, after the dreary sand-plain which extends away from Cologne to Holland along the banks of the Rhine; these wood-clad hills, crowned by an old castle, all reflected in a rapid and clear river, are a wonderful relief to the eye. Charming, however, as Cleves is from a landscape point of view, it must be acknowledged it does not offer much to attract the architect. For although the castle is ancient, yet it has been so patched and altered at various times that, with the exception of the great tower called "The Swan Tower," and an old inscription or two let into its walls, there is little worthy of notice. The town contains three ancient churches, the principal of which, called the "Stiftskirche," or, as we should call it, the collegiate church, crowns one of the hills, and is a striking-looking building at a distance. It consists of a lofty nave and aisles, terminating in apses, with two towers at the west end capped by slate spires, and a lofty *flèche* marking the junction of the nave and chancel. The date of the completion of this

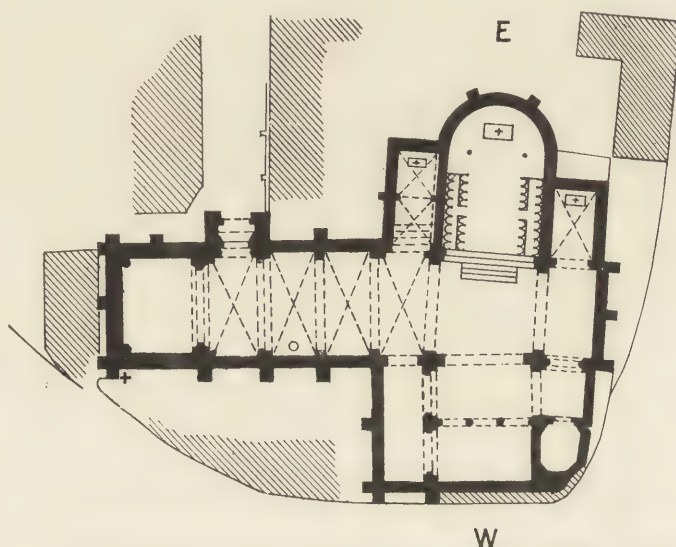


FIG. 136.—SKETCH-PLAN OF THE OLD MINSTER AT EMMERICH.

church is 1334. The material of which it is constructed is somewhat singular: the walls are of red brick with stone dressings, but in some places they are banded with a kind of artificial stone, which is used in such an irregular manner that it may be a question whether it is not the material of some older building worked up. A curious feature about this church is that all the clerestory windows are blocked up, their traceries, which are good geometric work, showing only on the interior; and, strange as it may appear, I am inclined to think that the treatment is ancient. For furniture there are two well-carved triptychs at the ends of the aisles; two prettily-designed altars against the piers of the nave; a wooden sedilia and two large aumbries. There

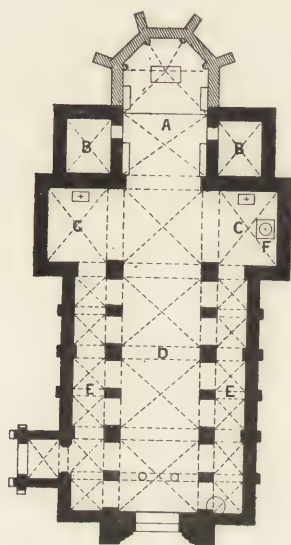


FIG. 137.—SKETCH-PLAN OF  
CHURCH AT WISSEL, NEAR CLEVES.  
A, Choir. B, B, Towers. C, C, Transepts.  
D, Nave. E, E, Aisles. F, Font.

are also two fine monuments to the former rulers of Cleves: one bears upon its slab a magnificent Flemish brass of a lady, and the sides of the tomb are inlaid with small plates representing the weepers. I think that the whole is the work of the fifteenth century. The other tomb has two recumbent effigies, and its sides are adorned with niches filled with statuettes. The old Dominican church in the lower part of the town is a very plain brick building, quite Dutch in character, but it contains an extremely beautiful set of choir-stalls.

About three miles from Cleves, at a place called Wissel, is a beautiful village church. It is one of the most perfect examples I know anywhere of an unaltered twelfth-century building. It consists of a nave covered with three quadripartite bays of vaulting, each of which encloses two pier arches, with one triforium opening and a single clerestory window; there are shallow transepts, and a shortish chancel flanked by towers, which are gabled on all their sides, and retain their original Romanesque cappings [fig. 137]. The apse has been rebuilt in the fifteenth century, and has late Gothic windows; the other windows in the church are round-headed, though the arches and vaultings are pointed. There is not much old furniture left; there is, however, a very singular-looking font, a little sacrament house, a well-carved aumbry and sedilia, and a portion of a fifteenth-century organ-case worked up into a modern one. The modern German decorative painter has been at work. These metallic greens and hot orange tones which seem to delight German eyes are sorely out of character in this severe and simple early church.

Three miles beyond Wissel is Calcar, a pretty old Dutch-looking town, with mediæval fortifications of brick, and a lofty but very plain Flemish-looking church, consisting of a nave and aisles the same height, an apsidal chancel flanked by two chapels, a lofty brick tower at the west end, crowned by a short slate spire, and two fairly good porches. There is nothing about the church itself to call for special notice, but it is probably one of the most richly furnished churches in Europe. It contains seven altars, each of which has a most magnificent carved and painted



triptych reredos, all works of wood-carvers and artists of the school for which this little town was so celebrated at the commencement of the sixteenth century. Unfortunately the names of one, or possibly two, of these artists have alone escaped oblivion. "John of Calcar" and Johan Juste (who, by the way, may possibly be the same man) are the only names with which we are acquainted; but it is impossible to see the magnificent painting at Calcar and other churches in the neighbourhood without being impressed by the fact that the school possessed very great merits, and is one that well deserves study, as we shall find in it that right balance between the ancient and modern styles, and that combination of merits of both the Flemish and German schools, which are what many decorative painters of modern time aim at attaining. For while these pictures assimilate well with their architectural surroundings, they represent the scenes in a more naturalistic style and less archaic manner than is done by the earlier painters of the German school. Not less great than the painters were the wood-carvers of Calcar, and the great "Pietà" which occupies the centre niche of the altar in the Lady-chapel of this church is one of the most noble groups of sculpture I have ever seen anywhere; the figures are life-size, the expression of the face of the Madonna most touching and beautiful, and the lifeless body upon her knee is so wonderfully represented that one feels distinctly it would fall to the ground were it not supported by the arms which clasp it. Unfortunately this noble work is in a very bad light; and as it is of dark oak uncoloured, it is most difficult to make a drawing of it.

The triptych over the high altar at Calcar is a wonderful composition, representing the Passion of Our Lord in a series of groups composed of some 200 statues. Although the framework which encloses this marvellous collection of bas-reliefs is quite Gothic, yet, owing to the great preponderance of the figure-work and a certain absence of subdivision, the general effect of this altar is rather later than that of the side altars, although some of the latter have details which are very distinctly Renaissance. In addition to the altars there is a graceful stone tabernacle, a set of elaborately carved choir-stalls, and a great suspended statue of the Madonna, surrounded by a carved bordering representing the "genealogical tree of Jesse." Unfortunately the eastern windows of the apse are modern, and although designed by a great artist, Steinlie, their style of colouring does not harmonise with that of the altars or the paintings upon the wings of the triptychs. They are another proof of the fact that I have previously stated, that if our stained-glass is ever to equal what was done in the Middle Ages, the windows will be produced by architects and not by painters. The side windows, which are also modern, both as to their tracery and glass, are filled with grisailles.

A walk of some eight miles from Calcar brings one to Xanten. It is scarcely an exaggeration to say that Germany does not contain a more interesting church than the Minster of St. Victor at Xanten. The town in which this noble church is situated is a very little place, scarcely more than a village; it possesses very extensive remains of mediæval fortifications, and one good gate all of brick and rather Flemish in character. The first view of the minster church is not very striking, as its somewhat

flat and bare Romanesque front, flanked by huge square towers crowned by rather ungainly slate spires, when seen at a distance is not particularly imposing. Passing through one of the town gates one arrives at the market-place, and here a remarkable scene presents itself. The whole of one side of the square is occupied by a series of ecclesiastical buildings; at the west end of the side stands the singular-looking Protestant church, with one of those quasi-Romanesque towers to which I have previously alluded. This building is nearly square, and, although erected in the seventeenth century, has curious Gothic windows. Near to this is another far more interesting church or chapel, which has a prettily designed fourteenth-century bell-turret. The nave is built over a gateway, pierced by a lofty semicircular arch; the little apsidal chancel is Romanesque, and looks early in the style; the flank of the minster church, with its high-pitched roof and elaborate pinnacled flying buttresses and great Romanesque towers, is seen rising over these buildings. Passing through the arched gateway one enters a remarkably picturesque churchyard, or close. In the immediate foreground is a large representation of the Crucifixion, with the attendant figures and the two thieves. At intervals round this enclosure are a series of open chapels of late Gothic work, each enclosing a group representing the various stations of the Passion; immediately to the left is the picturesque external staircase leading to St. Michael's Chapel, and opposite is the principal doorway leading to the south aisle of the minster; it is a very elaborate work of the fourteenth century, adorned with a good deal of fine sculpture. The doors are very singular, and are amongst the few features of the church which bespeak a Flemish rather than a German origin. The "framing" is *external*, and the "sheeting" is *internal*. The beams of the former are chamfered off into small circular panels, with cusping cut out of the solid. This form of door is not uncommon in Holland. The exterior of this church is singularly rich and imposing, owing in a great measure to its grand series of double flying-buttresses, crowned by canopied niches and pinnacles. The plan [fig. 140] deserves attention especially on account of the arrangement of its eastern termination. It consists of a Romanesque west end, flanked by great towers, so large, in fact, that internally they form a pair of western transepts. Then we have a nave with four aisles, all terminating to the east in five apses arranged in a very peculiar manner, as those terminating the aisles are not placed at right angles to the latter, but at an angle of forty-five degrees, so that externally they have the effect of radiating from a common centre. This is a very valuable and interesting example of a curious problem which the German architects at the close of the thirteenth century set themselves to solve, and which they never quite succeeded in doing. It is, "How to terminate a church to the east by a group of apses, arranged in such a manner as to avoid the French '*chevet*' and radiating 'chapels'?" Now the nearest approach to a perfect solution is, perhaps, the beautiful Liebfrauen-kirche at Trèves, the eastern portion of which is almost identical in plan with Xanten, but has this advantage over the latter: that whereas at Xanten the composition comes to an end at a line drawn to the west of the smaller apses, at Trèves the idea is continued by apsidal transepts and a series of apses again to the



west of the transepts, so that the idea of a radiating plan is consistently carried out, every feature having a common centre under the lantern. Trèves, moreover, must bear away the palm, because it is an earlier work than Xanten; the Liebfrauenkirche at Trèves was commenced in 1227 and completed in 1243, whereas the earliest date recorded at Xanten is 1263; so that, as far as the plan is concerned, Xanten must be regarded as a copy of Trèves. I am by no means sure that the builders of Xanten did not at first intend a more absolute reproduction of Trèves, for there are indications about the piers of the aisles, where the outer range of apses occur, which lead me to conjecture that transepts were originally contemplated. At Kaschau, in Hungary, the same arrangement was reproduced in a late fourteenth-century church, but less successfully than at Trèves and Xanten.

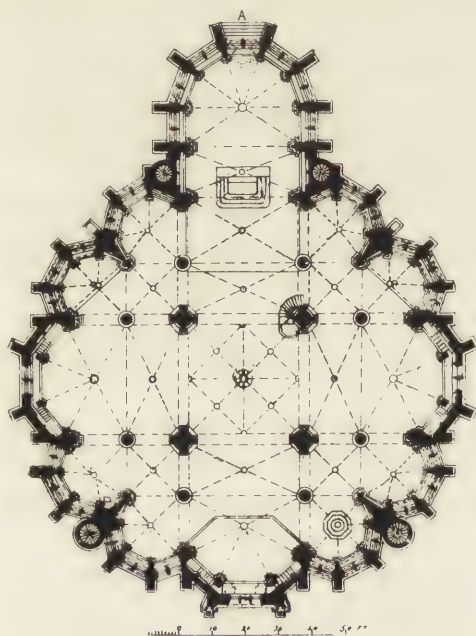


FIG. 138.—TRÈVES. CHURCH OF OUR LADY.  
A, Doorway from Cloisters.\*

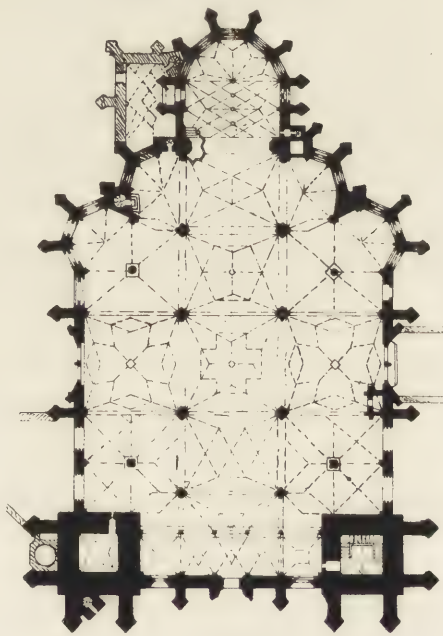


FIG. 139.—KASCHAU. THE CATHEDRAL.

There is, however, one defect about the whole scheme which is common to all these churches, and that is this. Although the idea of a group of apses is made distinct and evident enough on the exterior, when seen from within the idea is completely lost, and in this respect it must be acknowledged that the German plan is very inferior to the French *chevet* and radiating chapels. The Germans, however, were never convinced of the fact, because we find them again and again attempting to improve upon the French idea, and, although they did not succeed, their attempts are very interesting. One of the most peculiar efforts of this kind is to be seen in the treatment of the eastern apse of Augsburg Cathedral, commenced in 1321. Here the apse is considerably elongated, so that the centre bay is about two-thirds the

\* A doorway in a similar position is found at St. George's Chapel, Windsor.—H. W. B.

width of the choir, and is pierced by a very large window, the other sides having only very small ones high up; the aisle passes round the apse, but the screen at the back of the high altar describes a much flatter apse than do the walls of the clerestory, so that the two columns which support the angles of the apse and its arches stand out free in the middle of the ambulatory. The general internal effect of this arrangement is a kind of combination of our English east window and the French *chevet*. The result, however, cannot be regarded as satisfactory, though it is interesting and original.

I cannot help thinking that the German idea of a group of apses without a *chevet* has never been quite played out, and a clever and original architect might still hit upon some plan of solving the problem which seems to have exercised the minds of the mediæval German builders. Do not suppose for a moment that I undervalue the charm of our old English east windows and square-ended churches, but I certainly should like to see our stained-glass a little more perfected before it is made the leading feature in our church interiors. A square east end with such glass as one sees at York Minster or Malvern Abbey is delightful, but a vast east window filled with the "ecclesiastical art manufacturer's" glass is not quite so satisfactory.

The western portion of the nave and aisles at Xanten is later in date than the choir and aisles, and the rich and beautiful flying buttresses cannot date earlier than the middle of the fourteenth century. A curious treatment may be noticed in the aisle windows; they have no hood-moulds, but over each is a recessed and highly enriched arch which does not follow the curve of the window arch, but springs from little corbels attached to the buttresses.\* The north side of the church can only be seen from the cloisters; it is not so elaborate as the south, but is even finer in design.

The interior is wonderfully striking. The clustered columns with their richly carved capitals, enriched cornices, lofty clerestory, noble vaulting, the beautiful perspectives of the double aisles, the stained-glass, and above all, the magnificent old church furniture which meets the eye in every direction, produce such a picture as I have seen in no other church, and I doubt whether anything can be found to surpass it out of Spain. At Calcar we saw the effect of a plain and not very remarkable church full of splendid furniture, but at Xanten we see a singularly rich and beautiful building, equally richly furnished; and whereas at Calcar the fine carving is confined to the woodwork, here the great canopied niches and statues attached to the columns are as worthy of attention as the altar-pieces. The ritual arrangement of the church has never been interfered with, although the collegiate establishment, which numbered (so it is said) fifty canons and prebendaries, was suppressed in the last century. The great solid Rood-screen [fig. 141], stalls, and numerous altars have not been removed, the nave being used for low masses, sermons, and other services, the choir being reserved alone for high masses. In addition to the Rood-screen, a work of the fourteenth century, a light and beautiful screen of brass [fig. 142] stands immediately in front of the high altar; its purpose seems simply to bear thirty-six great candles, and is unique, as far as

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\* Compare Halls at Penshurst and Mayfield; Bishop's Palace, St. Davids.—H. W. B.



I know. It is evidently Flemish work, and bears the date 1520. The high altar has a great double triptych reredos, and when the inner doors are thrown open discloses a series of niches filled with fourteenth-century reliquaries, a shrine in metal-work of the thirteenth century, and a number of pictures by Bartolomeo de Brun

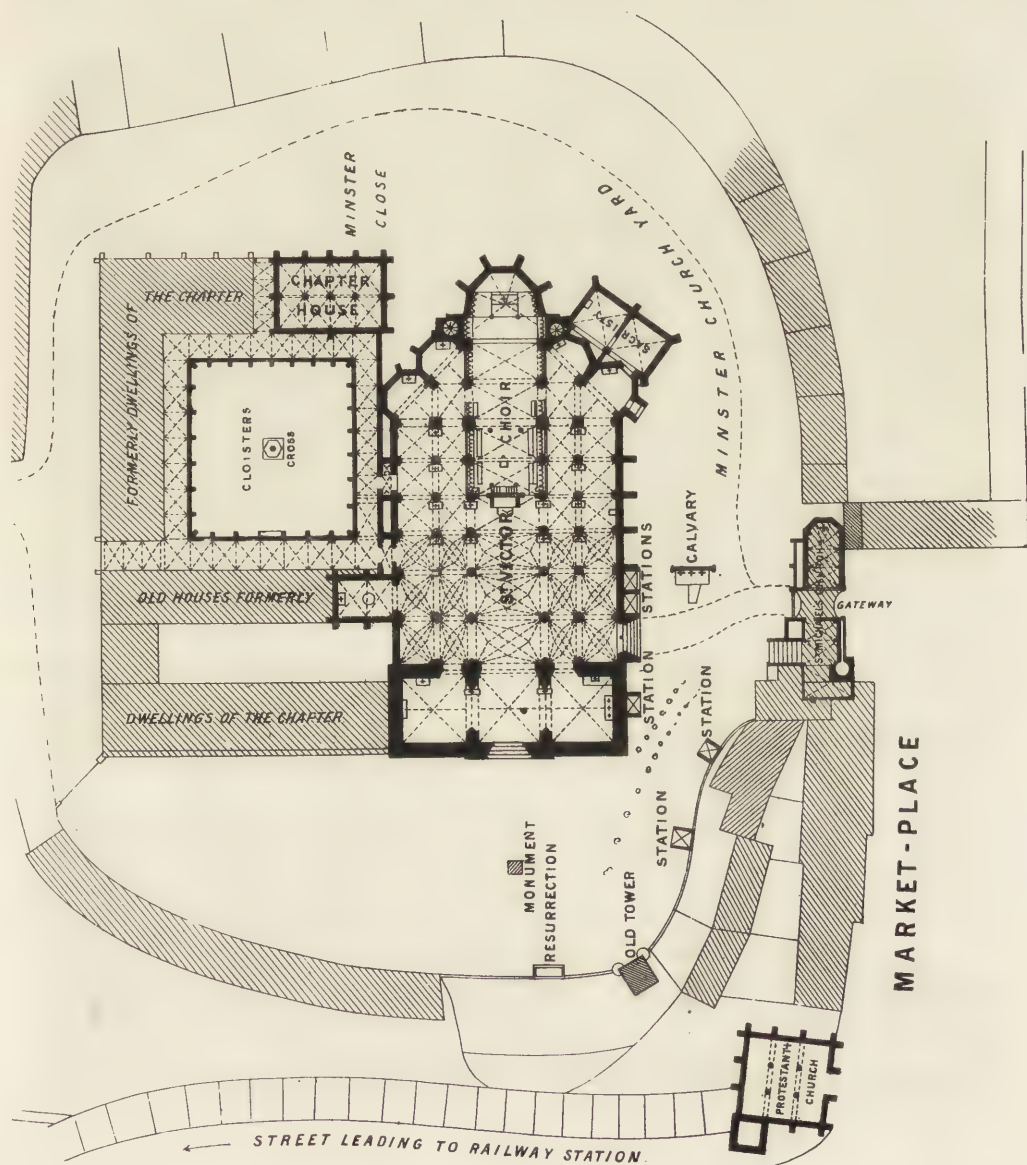


FIG. 140.—XANTEN. SKETCH-PLAN OF THE MINSTER AND ITS SURROUNDINGS.

and John of Calcar; the wood framework, which is all gilded, is a rich example of early Renaissance work. There is a very fine set of stone sedilia, and side-screens adorned with niches filled with statues. The stalls look like thirteenth-century work; their backs, and the walls of the apse below the windows, are hung with magnificent

old tapestry, upon which I noticed the date 1520, and in the centre stands a lofty triple candlestick of brass. The altar furniture is all ancient. The glass in the ten windows of the apse is rather a jumble; some portions of it are evidently twelfth or early thirteenth-century work, but the greater portion is sixteenth-century Renaissance; the effect is, however, very rich and fine. The glass of the clerestory windows



FIG. 141.—XANTEN. THE ROOD-SCREEN. (From a photograph.)

throughout the church is in a very imperfect condition. It appears to have formed a series, and to be Renaissance in date, as is also the great tabernacle. Seven of the altars in the nave and aisles are surmounted by mediæval triptychs. Those of Our Lady and St. Anthony are evidently works of the Calcar school [fig. 143], and are uncoloured. One, representing the scenes of the Passion, is richly carved and gilt, and



is certainly Flemish work, crowded with minute figures; \* the others are quite German in character, and consist of large niches containing single figures. The remaining



FIG. 142.—XANTEN. THE CANDLE-SCREEN. (From a photograph.)

reredoses are Renaissance, mainly of a late character, but far better in design than most works of the kind. There is an early Romanesque Calvary, which has, however, been recently restored, and has suffered much in the operation. The organ and stained-

\* The centre portion of a triptych of *precisely similar design*, illustrating the same subjects, is to be seen at Saint-Germain l'Auxerrois, Paris. They are certainly by the same hand.—H. W. B.



glass of the west window are likewise modern. The latter is "painter's glass," and the painters have painted it in all the colours of the rainbow, but where is the glass?



FIG. 143.—XANTEN. REREDOS OF THE CALCAR SCHOOL. (From a photograph.)

Will painters ever understand that a window is glass and not canvas? The buildings



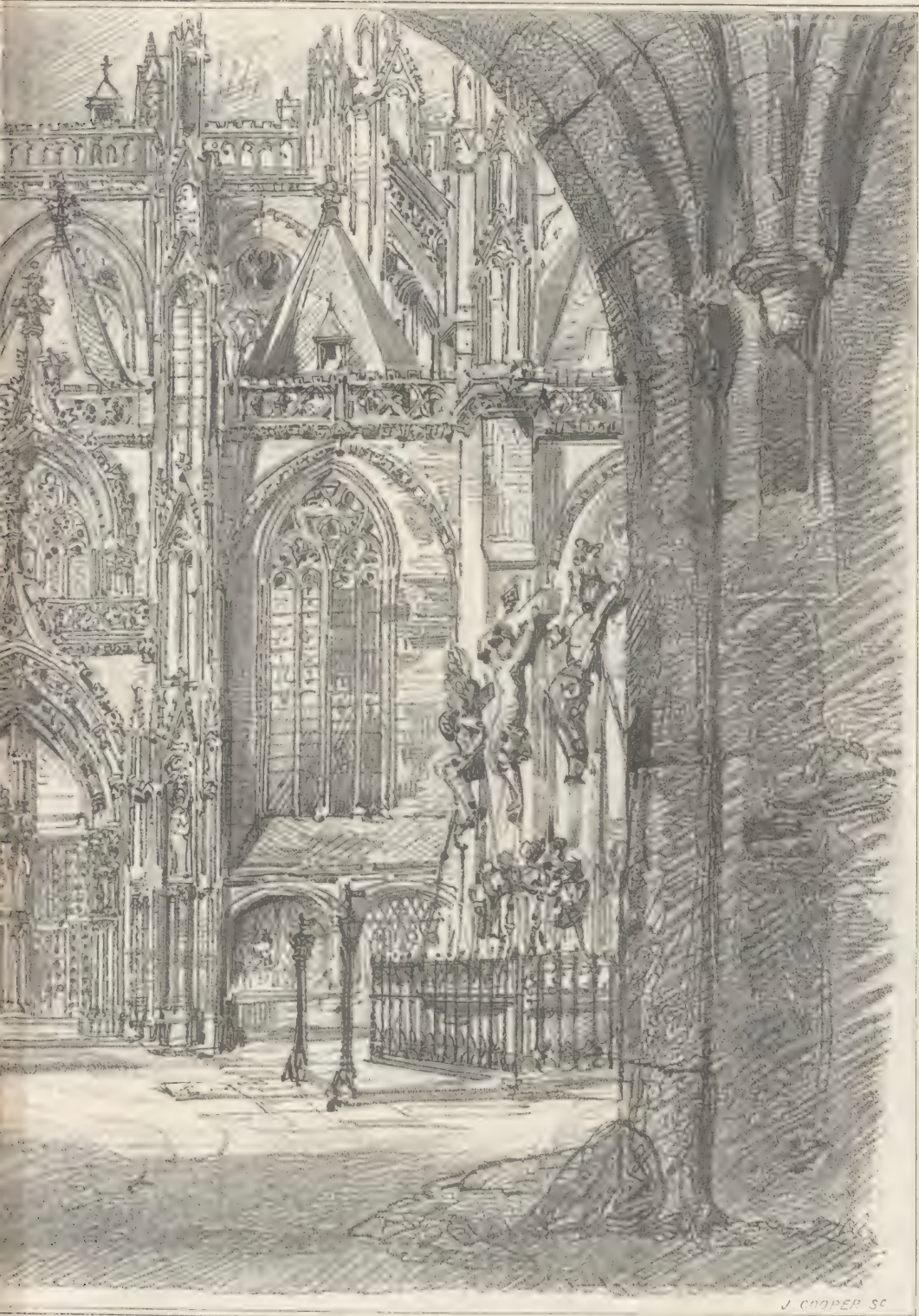




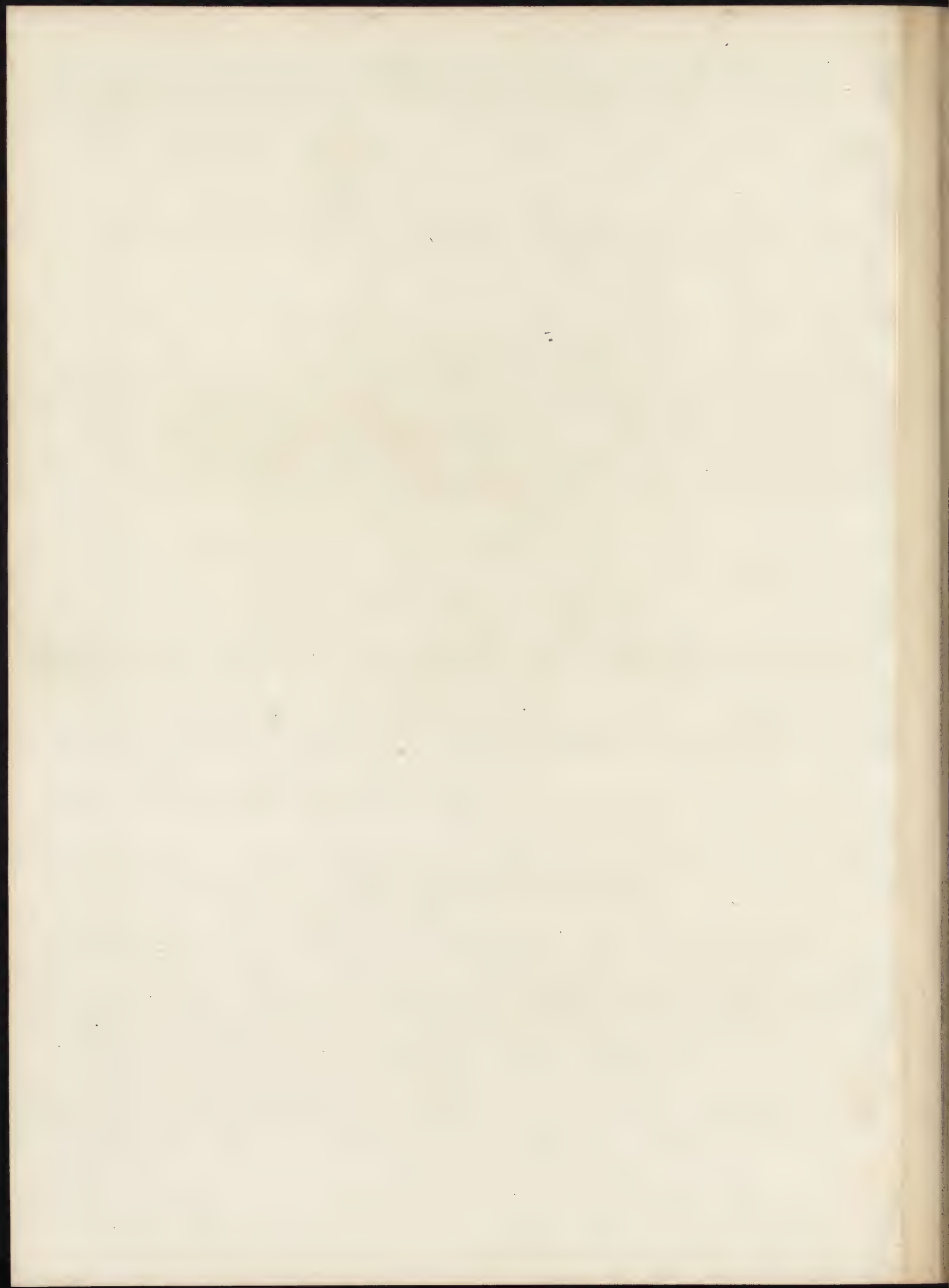
*From a pencil drawing by H. W. BREWER.*

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attached to this beautiful church are worthy of it. There is a very pretty chapter-house, divided by a row of slender, capless, octagonal columns down the centre, and full of wonderful examples of ancient hangings, embroidery, antependia, and vestments of every date from the twelfth to the eighteenth century. The cloisters, though very simple, are charming, and their walls are covered with inscriptions, mural tablets, incised slabs, &c., some of which date from Roman times. Xanten was an important Roman station, and works of that date are found in great quantities in the town and vicinity. The dwellings of the canons and prebends surround the whole close, and some of them still preserve a good deal of their ancient character.

There is one point about the church and adjacent buildings to which I should wish to call attention; it is the great beauty of the roofs. I believe a good deal of the slating

is original, and the high pitched roofs of the nave and aisles are adorned with very pretty little dormers, with elegant lead finials. The slates are all laid obliquely, with those covering the flashings scalloped, and reversing the general line. I could not help contrasting it with the treatment of our modern roofs. The Germans evidently carefully studied their roof coverings, and treated them artistically. Unfortunately,

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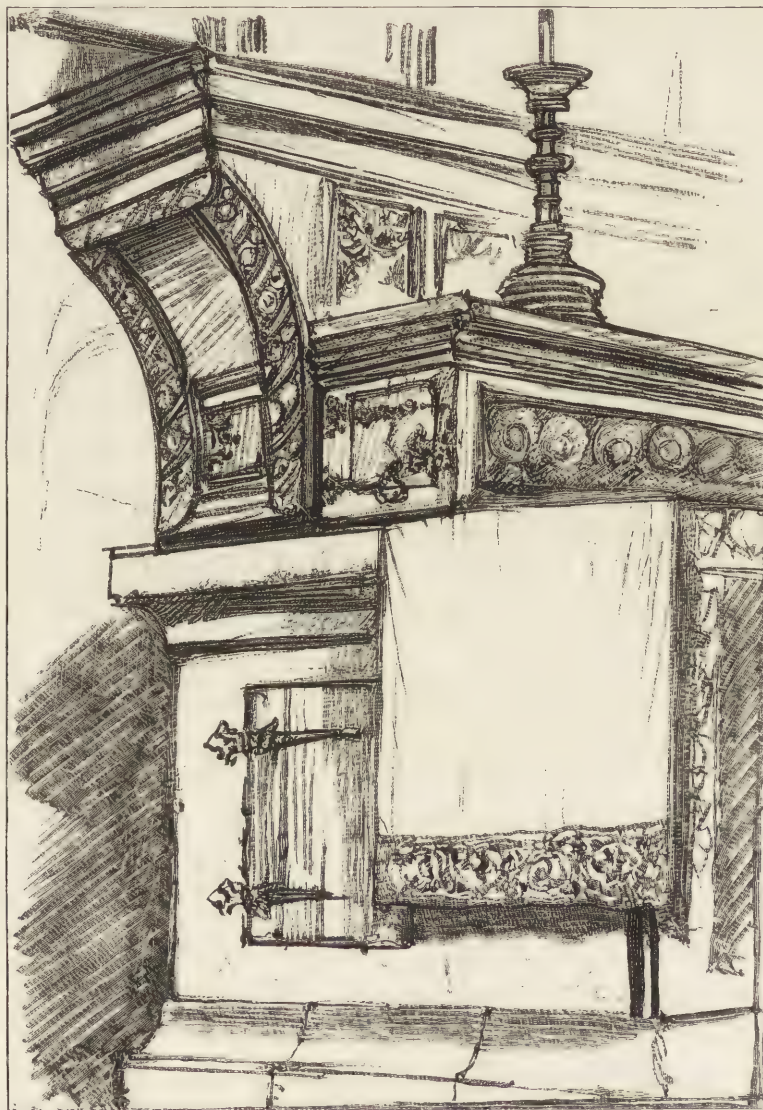


FIG. 144.—XANTEN. A "SUPER-ALTAR."

(From a pencil drawing by Mr. Brewer.)

nowadays church roofs are left to take care of themselves, and are generally most unattractive. A great unbroken mass of blue slate or red tile is a very unsatisfactory crowning feature to a great building, and where something better cannot be provided, surely it would be advisable to adopt the English fifteenth-century method and use a low pitched roof concealed by parapets. The late Mr. Sedding, whose untimely death we all so deeply deplore, seems to have been of this opinion.

The sacristy at Xanten is well worthy of attention. It is a delightful old apartment, with prettily painted vaulting, picturesque old presses, lavoirs, &c., and contains an interesting collection of church plate. Nor must I neglect to notice the singularly beautiful cross in the centre of the cloister garth.

I think that the great value of this beautiful building is, that it helps us to realise what must have been the effect of our mediæval churches before they were denuded of their furniture [fig. 144], or ruined by modernisation. No doubt in the Middle Ages there were many churches quite as elaborately and richly furnished as are those of Xanten and Calcar; and the great cathedrals must have been far more magnificent and infinitely more imposing; because, after all, Xanten is, when compared with the latter, a small building, as its length does not exceed 230 feet, and the extreme height to the vaulting is only 75 feet. I should mention that several of my drawings of Xanten and Calcar\* have been published in *The Builder*.

There is one question which I have been quite unable to answer, and which greatly puzzles me, and it is this: To what particular school did the architect of Xanten belong? He must, I fancy, have been a South German, and the work which most resembles it is Ratisbon Cathedral. Yet that resemblance is not very distinct, and is perhaps only brought about by the general richness of the two buildings. Except the plan of the eastern portion, there is nothing whatever at Trèves to solve the difficulty, nor is there anything in the neighbourhood that in the least resembles it. The double aisles and flying-buttresses seem at first to suggest the Cologne school; but the strongly marked horizontal lines, cornice over the pier arches, and absence of triforium, militate against this idea. Westphalia, with its rich Gothic work, occurred to me; but I find no building there which could be by the same architect. The beautiful apse of the Church of Hal, near Brussels, certainly bears a resemblance to that at Xanten, but scarcely sufficiently so to warrant the theory that they are by the same architect. As Xanten was a famous pilgrimage church and a very important establishment, it is highly probable that the architect was called in from a distance. Hal was also a celebrated pilgrimage church, and as neither of these churches resembles anything in its immediate neighbourhood, and do to a certain extent bear a family likeness one to the other, it is possible that they may both be by the same architect. But, if so, I fancy he must have hailed from South Germany.

In conclusion, I trust it will not be thought that I have been unnecessarily severe

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\* A drawing, from Mr. Brewer's pen, of the Parish Church of Calcar, is reproduced in *The Builder*, vol. lviii., p. 174; and others, similarly executed, of the cloisters, the interior of the choir, and of the south aisle of Xanten Church, are given in the same volume, pp. 250, 322, and 358.



in my remarks upon modern glass. I am quite willing to admit that our stained-glass makers in England can turn out excellent work ; but when one considers that one single stained-glass window can destroy the whole harmony of an interior, that an ill-arranged and badly-assorted combination of colour ruins the effect even of the noblest architecture, it is most important that the architects of our buildings, especially churches, should make some very decided effort to get these features into their own hands ; and even if they do not absolutely draw and design the glass, it should be produced under their advice and control.

No one can, I think, see such an interior as that of Xanten without being struck with the fact that, notwithstanding the elaborate furniture and decorations, they add to the general harmony of the building, no single object attracting undue attention or withdrawing the eye from the charm of the whole, though each is exquisite when examined separately. A friend who was with me at Xanten used to sit for hours on one of the benches in the nave of the church. I often said to him, "Come and look "at this triptych," or "that screen." "No," said he ; "I can see fine triptychs and "elaborate screens elsewhere, but when looking at the general effect of this interior, "I can for the first time in my life realise the idea of a complete mediæval church."

H. W. BREWER.

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NOTE ON THE FOREGOING PAPER.

By COLONEL LENOX PRENDERGAST, *Hon. Associate.*

These churches of the Lower Rhine belong to the years immediately preceding the time known to us as the period of "The Reformation." By a singular chance a cluster of buildings situate in the neighbourhood of Cleves has escaped not only the ravages of the iconoclast and the destroyer, but also the destruction, in some cases more complete, which comes of the desire to replace existing furniture by something more in accordance with prevailing fashion. They are specially notable because their original fittings exist *in situ* untouched, and in most cases but little added to.

To those engaged in bringing before the members of the Institute everything which can throw light on the arts practised amongst us, it is of importance to obtain a vivid conception of the purposes for which these buildings were erected ; some of them plain even to baldness in their construction, but instinct with life directly the accessories which they were constructed to contain are brought before us in the places they were originally designed to occupy.

By the light of the sketches Mr. Brewer has given us to study, we are at once face to face with what these great churches were at a time when ecclesiastical furniture was all-important, and able to realise in some degree the *raison d'être* of so much which puzzles ordinary people when dealing with church buildings of the Middle Ages. Even so shrewd an observer in matters architectural as my friend, the late Mr. Fergusson, when writing of one of these very churches—I think it is that of Xanten—

has been led astray through not knowing the ritual reason for the arrangement of the side altars in this church, which possesses exceedingly early examples of unscreened chapels. It shows that, at the period when his remarks were made, no guiding hand was present to interpret the ecclesiological meanings of the arrangements, which seemed to produce on the architectural expert the very opposite effect to that which, as a matter of fact, they possessed. To realise great architectural works it is essential to understand the uses to which they were originally put. The group of churches under consideration is, strange to say, precisely, ritually speaking, what every Catholic church of the present day is, so far as a multiplicity of unscreened altars placed throughout the church express the prevalent arrangement. This plan was a necessity of the time, and has remained so ever since, and has nothing to do with any doctrinal significance as to the more or less sacred character of the priests ministering at these altars, as supposed by Fergusson.

The proceedings of this Institute are sometimes criticised as being of a too archæological character. But those who criticise us thus must have little knowledge of what is required at the hands of architects from a public by no means indifferent to matters of this description. It is necessary for an architect to *know* the bearings of those accessories of the buildings about which he is expected to advise. An enthusiastic client goes, for instance, to Xanten, and sees what in reality is a singularly beautiful object placed in front of the high altar: a sort of arcade in brass of most intricate workmanship, to carry a row of lighted candles—in appearance not unlike a second chancel screen [fig. 142]. He would like to reproduce this; and if he did so, would make his church ridiculous. Why? Because this screen was part of an entirely obsolete practice, that of hanging a veil before the high altar in these particular churches from Septuagesima Sunday till the time of Easter. An account was published some years ago, in German, giving the most minute details regarding the furniture in these buildings, but this was before the present accomplished Librarian of the South Kensington Museum, Mr. Weale, happened to have discovered and transcribed the items of the *original* payments for many of these interesting fittings. I may mention that, for the aforesaid brass screen mentioned by Mr. Brewer as bearing the date 1520 [page 313 *ante*], in front of the high altar of Xanten, these original papers show that it was executed in 1501, and that the place where it was made was Maestricht. The church of St. Victor at Xanten is a very storehouse of art at a most interesting period; it contains not only sumptuous altar fittings allied to the fabric, but also amongst the treasures preserved in its sacristy are suites of vestments, chasubles, dalmatics, and copes, the embroideries of which are designed in the very finest style of the earliest Renaissance; religious subjects most beautifully designed are placed in small circular compartments, and these are joined together by panels of exquisitely designed arabesque ornament. There are further pictures of the carved work alluded to which will be found in a book published at Bonn in 1866 by Max Cohen und Sohn, and the author is Ernst Aus'm Weerth.

LENOX PRENDERGAST.



LXXXVI.

MEDIÆVAL ARCHITECTURE IN SWEDEN.

By J. TAVENOR PERRY, *Associate*.

Mr. J. Macvicar Anderson, *President*, in the Chair.

MR. PRESIDENT AND GENTLEMEN,—

I N presuming to address our profession on a subject so extensive and so important as the architecture of a large country, I must plead, in excuse, that no serious attempt has yet been made in England to describe the vast number of mediæval buildings which still remain in Sweden, or to give in any compendious form some idea of what the student in architecture and archæology will find to study in that country. The buildings of Wisby and the Island of Gotland \* have been well and often illustrated and described; but Wisby was a town of the Hanseatic League, and can scarcely be considered as belonging to the architectural province of Sweden. For any definite information, such as I have put together here, although in a very bald and disjointed manner, we look in vain. The English guide-books, and the travellers' tales of Marryat and Du Chaillu, give little information to the architect. The Swedish illustrated guide-book, containing, as it sometimes does, schemes for the restoration of the old buildings, rather than views of the buildings as they exist, is not much more useful. The great work by Montelius on Swedish history is so voluminous, and the accounts of the various buildings are so disjointed, by being described in the work only in periods or reigns, as to make them difficult to follow; and the incomplete volume of measured drawings by Mandelgren leaves us in doubt whether the buildings he illustrated still exist, as I discovered to my cost, when, after driving some miles in Skåne to visit the ancient church of Tryde, I found that it had been entirely destroyed about twenty years ago. My object, therefore, has been to bring together in a Paper such information as I have myself obtained during three visits to the country, or

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\* See TRANSACTIONS, Vol. II. N.S., for a Paper, by Mr. W. White, F.S.A., on "Wisby in the Island of Gotland," p. 66; with Notes on the same by Mr. R. H. Carpenter, F.S.A., p. 79; and "Notes on Wisby and other towns in Gotland," by Mr. A. H. Haig, p. 82.

gleaned from other sources, so that it may form the nucleus of a history of mediæval architecture in Sweden, which, published in our *TRANSACTIONS*, will be easy of reference to other architects who may be willing to expand my very meagre notes, by a more prolonged study of some of the principal buildings, and by a more careful review of historical authorities. I have to express my obligations to Herr Brusewitz, the painter, now Curator of the Gottenburg Historical Museum, not only for information he gave me on the spot, but for books and MSS., not to be found in the British Museum, which he subsequently forwarded to me, and for some most careful pencil drawings of fonts. I am also indebted to Mr. G. Edward Carpenter and Mr. Henry Jarvis for the use of photographs taken by them in Lund and Upsala.

The physical features of Sweden were altogether unfavourable to the development of an architectural school. With one half of the country covered with lake and morass, and the other half with granite, intersected by broad and rapid rivers, almost ice-bound for half the year, the difficulty of obtaining materials suitable for construction, and of transporting them from place to place, rendered the erection of any important building a work almost of impossibility. The country was but sparsely populated; and the frequent quarrels between the Svear and the Southern Goths for supremacy in Sweden, and the greater internecine wars among the three Scandinavian kingdoms, which lasted throughout the mediæval period, prevented any sustained effort in building operations, and very often caused the entire destruction of the works of a previous period. But these unfavourable circumstances had their effect in so modifying the arrangements of the buildings as to result, as we shall presently see, in such important local peculiarities as almost to amount to a "style."

As the materials most abundant and nearest to hand were granite and timber, all the earlier buildings were entirely constructed of these, and consisted of nothing but bare unornamented walls pierced with mere slits for windows, and covered with the simplest timber and shingle roofs. The granite was scarcely worked, but placed "random" in large blocks in coarse mortar, the only stones at all dressed being the quoins and arch-stones. In such condition the walls of Gamla-Upsala, Åbo, and Rântämäki still remain, except that they have been dashed up with mortar to conceal the granite. But the unworkable character of the material and the cost of transporting it any distance soon resulted in the substitution of brick, already employed in the South and in Germany, for the less important buildings; and it was not long before, with a few exceptions, brick wholly replaced in use the superior materials of granite and stone. The result was, that in all ornamental features the same peculiarities of treatment and detail were repeated as appear in those of the great churches of Pomerania and Mecklenburg; the same lofty gables, arcaded panelling, and blank tracery on the exteriors, and also the same bare, poverty-stricken interiors given over to plaster and whitewash. But to these brick buildings there were some fortunate exceptions, such as Skara, Linköping, Upsala, Örebro, and Lund. In the island of Öland there are extensive limestone quarries, and in Vermland is found a good building-stone, which takes a slight polish, known as "talc" stone; and where water accommodation served, these stones were



used. All the earlier work of the interior of Upsala except the vaulting is in stone, and nothing but stone was used at Linköping until the cessation of the works in 1499.

The work of the conversion of the Swedes to Christianity was going on throughout the eleventh century; but it was not until its close that this was anything like accomplished, or that any attempt was made to organise the Church in Sweden. When, however, this was done, the work of church-building was begun, and carried on with great activity. The earlier missionaries and first bishops were, to a great extent, Englishmen. Adrian IV., our English Pope, travelled through the country when he was Cardinal Albano, and by his advice, or under his immediate authority, the bishoprics of Upsala, Lund, and Linköping were founded. During the twelfth and thirteenth centuries also many of the bishops were Englishmen, and their influence, and that of those by whom they would be doubtless accompanied, may, I think, be traced in much of the work of that period; whilst later the closer intercourse between Sweden and Pomerania led to German influence becoming predominant. The Swede of the Middle Ages, as of to-day, always kind and courteous, had a mind singularly receptive of foreign ideas, and was perhaps but too willing to adopt them all. Thus we find in some of the buildings which I shall describe many details apparently not a little incongruous, but which might have later become welded together into a complete style had the people not been too busy with their wars and revolutions to attend to the arts of peace.

The illustrations to this Paper give to a great extent the principal architectural features of the works under description, and I will limit myself now to the history of the buildings so far as I have been able to trace it; and afterwards, by comparison of the examples, call your attention to what I consider may be characteristic of Swedish architecture, either in the plans or details, or in the general arrangement of the buildings themselves, and the furniture they contain.

The Cathedral Church of Lund, if not the first founded, is the oldest and most important cathedral in Sweden. The city of Lund was known in mediæval times as "Londinium Gothorum," to distinguish it from the English London, which distinction

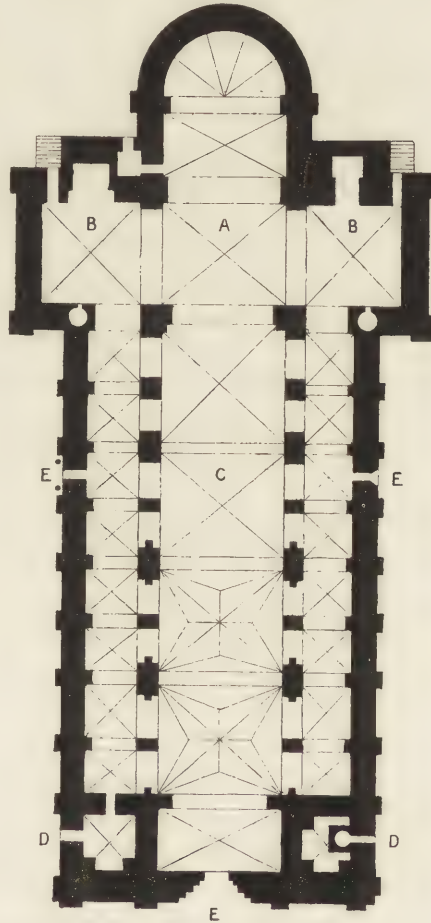


FIG. 145.—SKETCH-PLAN OF LUND CATHEDRAL.

Scale about 64 feet to 1 inch.

A, Choir; B B, Transepts; C, Nave; D D, Towers;  
E E E, Porches.

was not wholly uncalled for, as it was then relatively a much more important place than it is now. With the cathedral are associated many important historical events in Scandinavian history, and numerous legends are told as to the date and circumstances of its building, which the building itself seems to contradict. The Architectural Publication Society's Dictionary says that



FIG. 146.—CANOPY, N. TRANSEPT OF LUND CATHEDRAL.  
(From a photograph.)

to that of St. Mary's in the Capitol, Cologne, dedicated in 1049, particularly in regard to its crypt; but the work is much more elaborate in the carving than at St. Mary's, many of the columns being irregularly fluted in imitation of the painted graining of marble, and two having grotesque life-size figures attached. The two archbishops who had presided over its construction were Danes, and the one by whom it

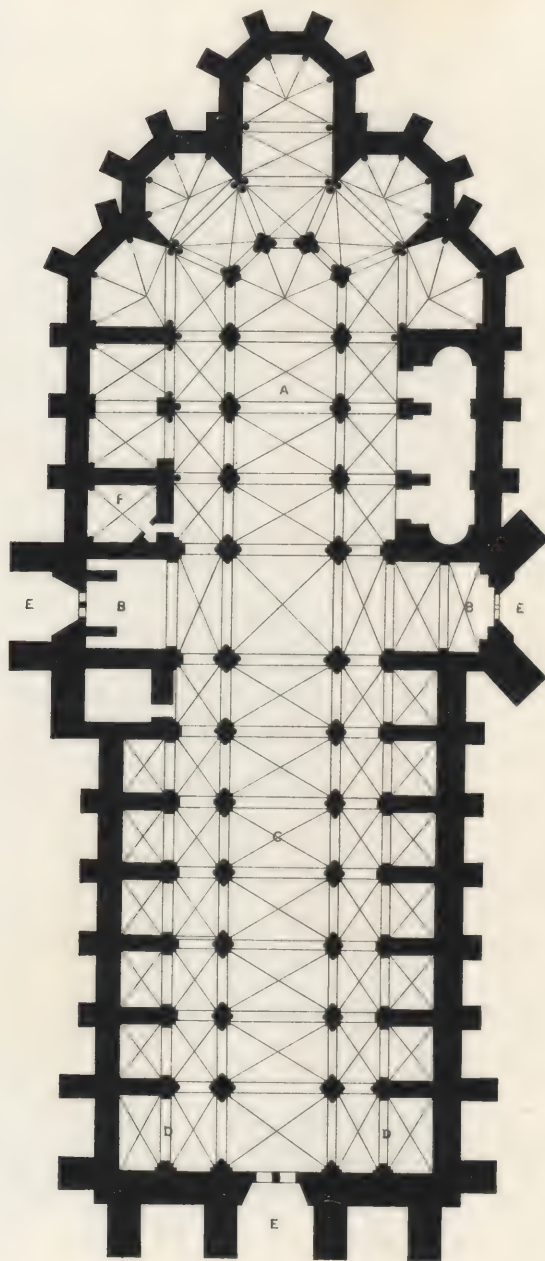
“the cathedral dedicated to S. Lawrence “was erected in 1072–85, by Donatus, “an Anglo-Saxon architect, for Knut “IV., after the model of Dinton Church, “Buckinghamshire”; and Marryat, who professes to have compared the two, says that at Dinton he found “two “apocalyptic monsters with trinitarian “tails of the same breed as those so “liberally scattered through the Cathedral of Lund.” The plan of the building [fig. 145] consists of a nave and aisles, western towers, aisleless transepts, an apsidal choir [fig. 148], and a large and lofty crypt extending under the whole of the choir and transepts—indeed, it is such a plan as one might expect to find in the region of the Rhine. From a comparison of the drawings published by Professor Brunius early in this century with the building as it now stands restored by Herr Zetterwalls, it would appear to have been nearly completed as it now is by its original designer; but the vaulting of the nave was not finished until modern times.

The date of 1072, given for the commencement of the building, may be correct, although the origin of the design cannot be traced to England.

In many respects it can be compared

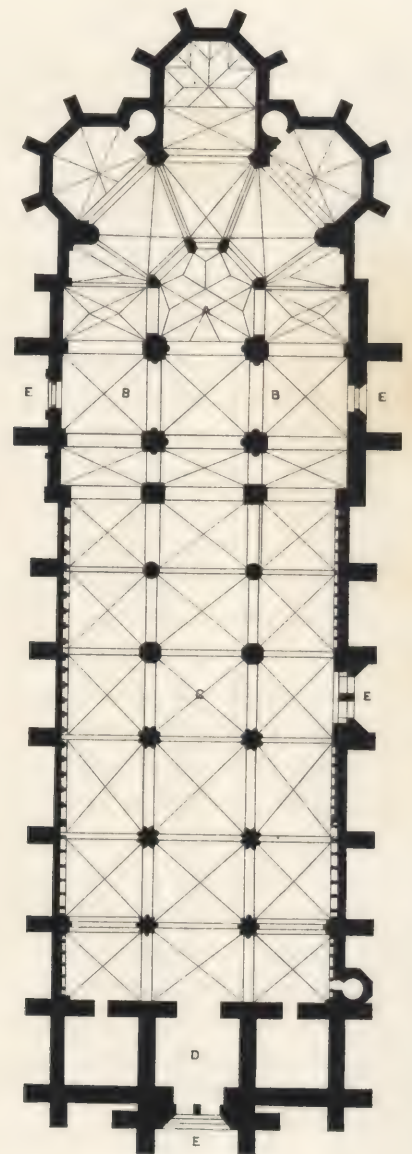






UPSALA CATHEDRAL.  
From Peringskiöld.  
[Pages 328-332.]

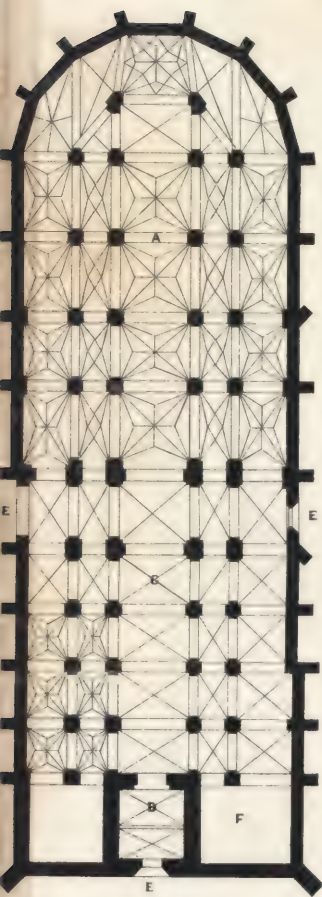
*J. Tavener Perry del.*



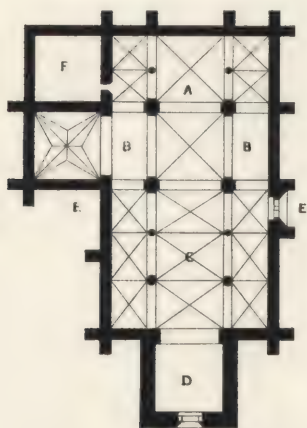
LINKÖPING CATHEDRAL.  
[Page 333]

SKETCH  
*Drawn to a Scale of ab*

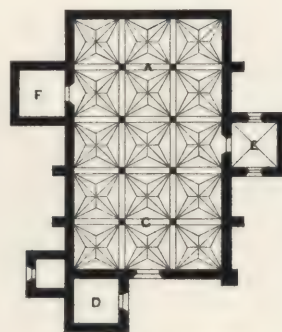




VESTERÅS  
[Page 341]



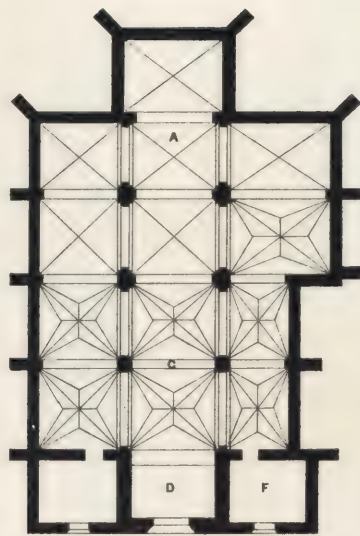
ST NICHOLAS CHURCH,  
ÖREBRO.  
[Page 337.]



RÄNTÄMÄKI, FINLAND.  
[Page 342.]



GREYFRIARS CHURCH.  
YSTAD.  
[Page 342.]



VEXJÖ.  
[Page 342.]

A. CHOIR  
B. TRANSEPT  
C. NAVE  
D. TOWER  
E. PORCH  
F. SACRISTY

PLANS.  
at 64 feet to 1 Inch.

C. F. KELL LITHO. B. FURNIVAL ST. HOLBORN. E. C.







FIG. 147.—THE NORTH PORCH OF LUND CATHEDRAL.

(From a drawing by Mr. J. Tavenor Perry.)

was consecrated in 1145, Archbishop Eskill, had previously been a canon of the cathedral, and was educated at Hildesheim, where he was surrounded by the best German roman-

T T



esque work; and to the intimate associations of these archbishops with Germany may, perhaps, be attributed the purely German character of the design of Lund Cathedral

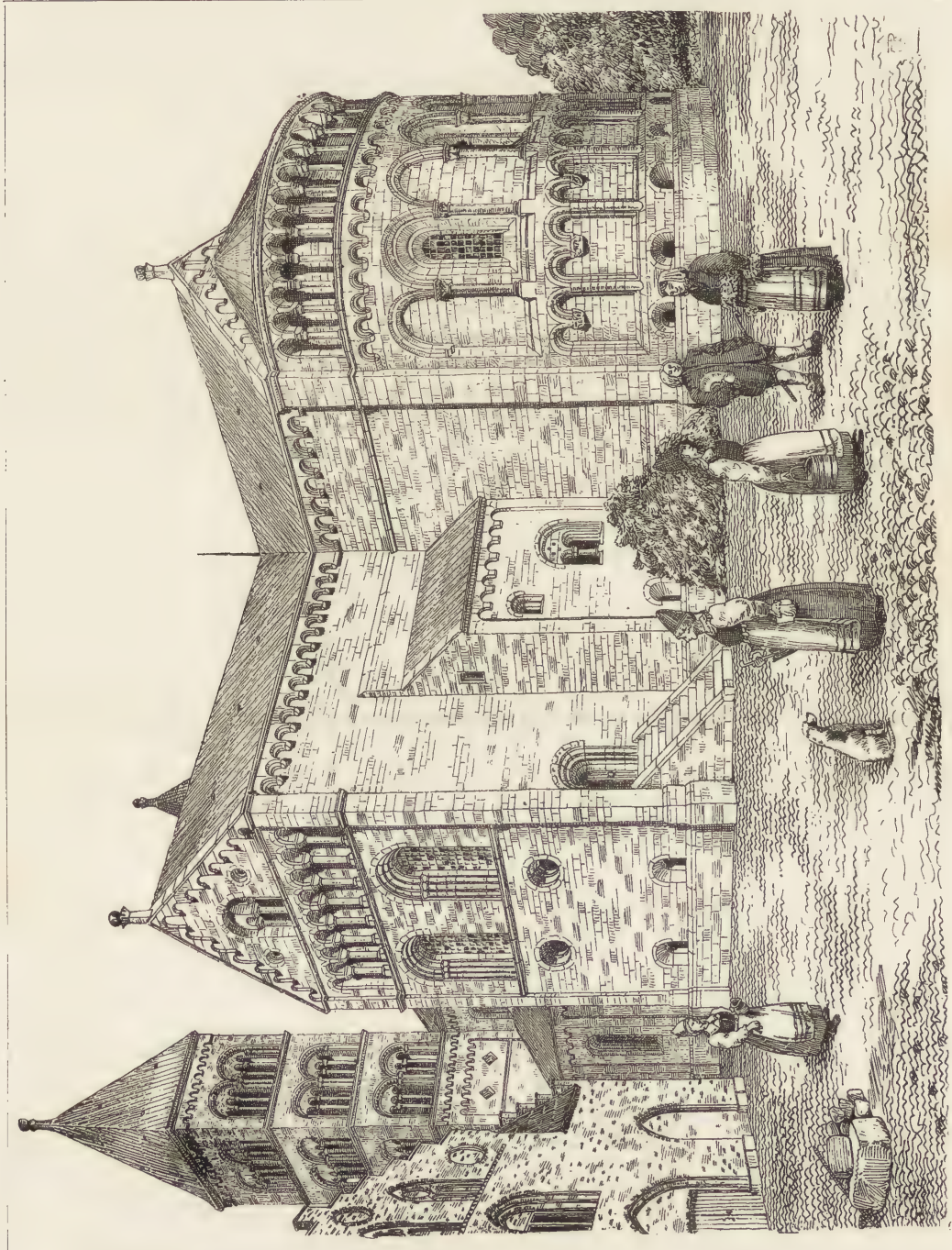


Fig. 148.—LUND CATHEDRAL FROM THE SOUTH-EAST.  
(From a drawing by Mr. J. Tavenor Perry.)

[figs. 147 and 148]. Whether the nave of the cathedral was intended to be vaulted is doubtful, but at least there appear to have been several attempts made to do it;



and the work which has been carried out under the recent restoration does not accord with indications left of the original design. There are corbels remaining between each clerestory window, showing that the vaulting then intended to be carried out would have corresponded in width of the bays with that of the aisles, and was unlike the late brick-vaulting, afterwards executed; \* whilst that which has more recently taken its place has necessitated the introduction of tie-rods at the springing of the arches and heavy bosses on the exterior. The whole building is carried out in good hard stone, and there is throughout it a considerable amount of good carving untouched by the restorer. The two most noticeable features of the exterior are the elegant apse with the open gallery round the eaves, and the north porch, richly carved, with detached columns carrying beasts, and of altogether Italian treatment.



FIG. 149.—DALBY CHURCH: THE BAPTISTERY.

Connected in many ways with the cathedral church of Lund was the large conventual church of Dalby [fig. 149], a few miles to the south. It is said to have been consecrated in 1163; but the crypt would seem to be at least as old as the oldest part of Lund. The present building consists of a large nave, a western tower, and a south porch or weapon-house. In the arcading of the porch and in the belfry windows are ordinary scallop capitals such as we have in any of our Norman churches; but the most remarkable feature is the so-called crypt. This is a large chamber vaulted in three aisles, the vaulting carried on four piers. Its position under the western tower, only a few steps down from the floor of the nave, and the fact that there is a well in it, show that it was constructed as a baptistery. The south-west pier is formed of a group of four

\* In reference, doubtless, to this, Mr. R. Herbert Carpenter, F.S.A., who visited the church in 1883, made at the time the following notes:—"Pointed arches with flat soffits to each double bay; vaulting-shafts 'thirteenth century, built in, in centre of central recess, evidently in accordance with a design never carried out. The shafts are octagonal on corbels, and have a circular cap and base.'" "The church evidently was 'altered more than once in its building; the vaulting shafts and pointed arches are not equal to what was 'originally intended.'" "Lund has the finest church in Sweden, and one regrets that it was so magnificently 'restored' at too early a date . . . the numerous alterations believed to have been made at various times have 'disappeared to make way for one uniform style.'"

columns, two diagonally fluted, standing on the backs of monsters, not unlike those at the west end of Soest. This church, like Lund, is built of stone.

The building of the greatest historical importance in Sweden, after Lund, is no doubt Upsala Cathedral, and it is of particular interest to the archæologist, as we have well-authenticated accounts of the foundation, and of the architect who was early associated with its erection. The history of Upsala goes back to the very beginning of Swedish history, and the building which became the first cathedral, and which still stands, is said either to have been a temple to Odin, or a part of the palace of his descendants when Upsala was the capital city of the Svear. This building, which is



FIG. 150.—UPSALA CATHEDRAL: SOUTH TRANSEPT PORCH.

(From a photograph.)

figured in the works of Peringskiöld and d'Agincourt, was a square hall of rough granite, having two lofty and wide arches or door openings on each face. It has been altered and heightened several times, and now forms the nave of the ancient church standing among the tumuli of the Swedish kings of the semi-mythic age.

When Upsala became the seat of a bishop, and still more so when the bishop became an archbishop, the smallness of the place and the inconvenience of its position determined the authorities to remove to the neighbouring town of Östra-Aros, placed nearer the river's mouth than the older city, and therein found a new cathedral. This migration appears to have taken place in 1260, a period when church-building was going on all over Sweden, and the archbishop should have had no difficulty in obtaining the



assistance he required for the task he had set himself to accomplish. Whether, however, owing to the want of funds, he delayed his work for a quarter of a century, or whether he was dissatisfied with the work as it progressed, it is certain that in 1287 he entered into an agreement with one "Estienne de Bonnueill,"\* an architect working at Notre-Dame of Paris, to go over to Upsala, there to build a cathedral on the plan of Notre-Dame. This course seems to have been adopted on the recommendation of the Abbot of Corvey, Elector of Cologne, who gave a bond of security to the archbishop that Estienne should carry out the work like the cathedral of Notre-Dame. There appears to be but little doubt that Estienne started from Paris for Upsala—the account of his leaving with twenty companions is vouched for by the Provost of Paris—and the Swedish students in Paris collected the sum of twenty silver livres to defray his and his companions' expenses. But when we come to look for the result of his work in the design of Upsala we find it difficult to credit the story exactly as narrated, although there is much to support the theory that Frenchmen may have been at work upon the building. At the time Estienne left Paris the nave and transepts of Notre-Dame were very much as we now see them, but the alteration of the east end had not been begun, and the surrounding chapels had not been built; but the eastern termination of Upsala bears no resemblance whatever to Paris, and is surrounded by five radiating chapels, and there is no likeness between the other portions of either of the buildings. The plan of the east end, as will be seen [Illustrn. viii], is much more German than French; while the carving and arrangement of the capitals of the great piers and corbels round the choir are much earlier in character than such as would have been designed by a French architect of that period; but, on the other hand, quite like the known Swedish work of the same date. It is probable that he may have worked on the three great portals [figs. 150 and 151], and that all the moulded work and the greater part of the carving are by him. In the south transept porch the work, where done in talc-stone, is of extreme delicacy and finish, and contrasts both with the tympanum of the west door executed in a coarser and, I think, earlier method, and the later work of the three patron saints and their pedestals in each portal, worked in a softer stone. On the whole, I am inclined to think that Estienne exercised but little influence on the plan of Upsala, which must have been mainly the work of native artists; but I can believe that he may have done much to improve the design, and even to found a new school of sculptors, who from that date freed themselves from the toils of the runes and snakes that had till then writhed and grinned through all their work. In confirmation of the theory that the building was well advanced before the arrival of Estienne de Bonnueill at Upsala, Montelius says (*Sveriges Historia*, vol. i., p. 414) that already in 1258 the Pope had

\* His letter of appointment is extant, and it partly runs thus:—"Estienne de Bonnueill, taillieur de pierre Maistre de faire leglise de Vpsal en Suece, proposant a aler en la dite terre, si comme il disoit, & reconnut endroit que pour mener & conduire au couz de la dite Eglise, aueques lui tex Compaignons & tex Bachelers. . . . En tesmoing de ce, nous avons mis en ce lettres le seel de la Preuoste de Paris. lan de grace Mil CC. quatre vinz & sept, le Semne de devant feste S. Gile & S. Leu, & nous le tampscriit de ces lettres auon seelle du seel de la Prevoste de Paris. Ce fu fe lan & le jour defus dit." The above is a literal quotation from a work (in the British Museum) entitled *Monumenta Ullerakerensia cum Upsalia Nova*, by Johan Peringskiöld. Fo. Stockholm, 1719.—J. T. P.



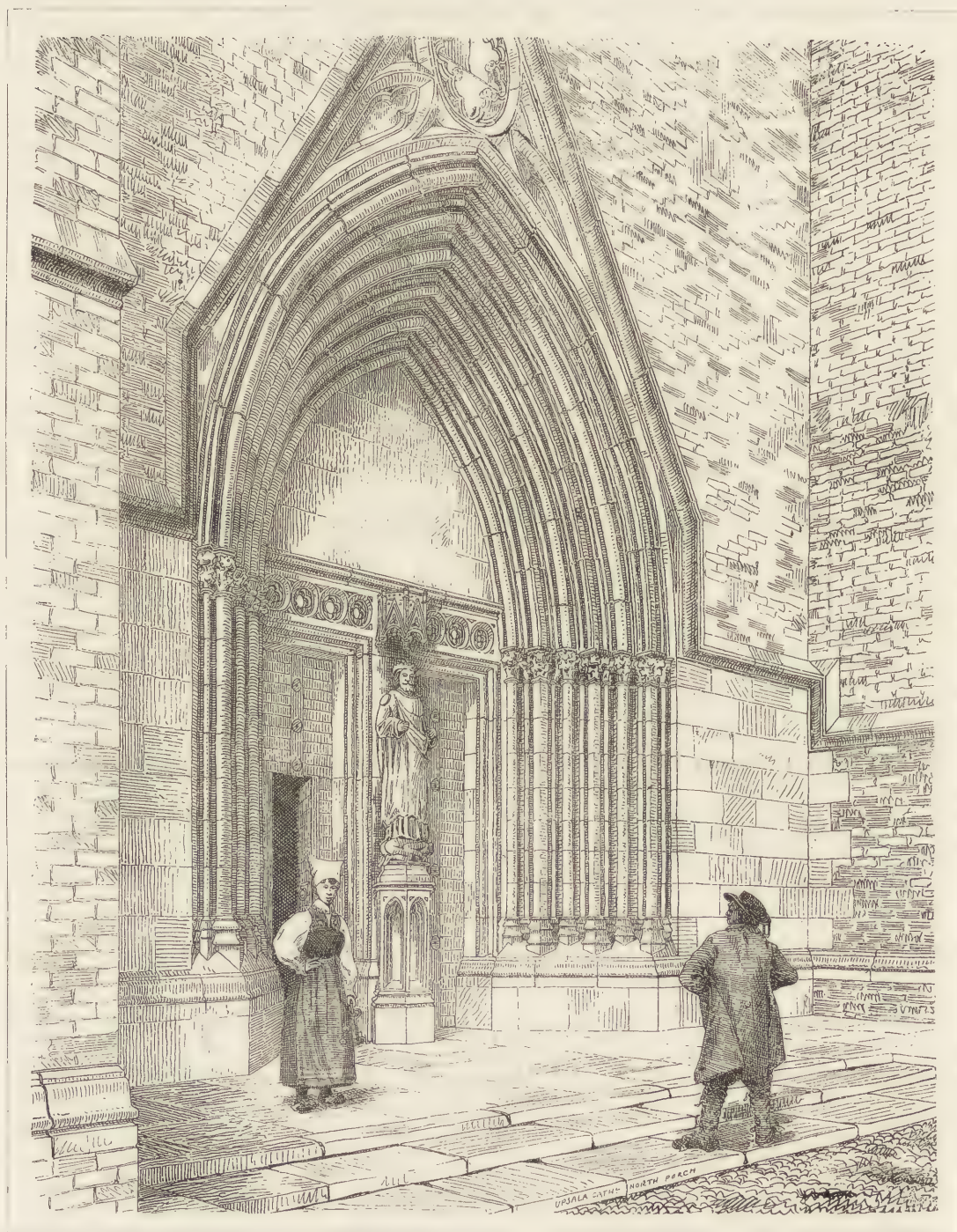


FIG. 151.—UPSALA CATHEDRAL: PORTAL OF NORTH TRANSEPT.

(From a drawing by Mr. J. Tavenor Perry.)



given his consent to the removal to Ostra-Aros, and that he and the bishops promised indulgences to all who would contribute to the work of the building, and then the foundations of the cathedral were laid. It must have been well advanced in 1273, or fourteen years before the possible arrival of Estienne, for in that year the bones of St. Erik, and those of the archbishops buried at Gamla-Upsala, were removed into the new church. The

corbel [fig. 152], which is one of a series in the piers surrounding the choir, illustrated herein, presents characteristics in its carving and the shape of the abacus, much earlier and ruder than the work on which Estienne would have been engaged in Paris, and than the carving in the north and south portals of Upsala itself. The square piers

with nook shafts [fig. 153] are very different from French work of so late a date as the end of the thirteenth century. It would, therefore, seem that either the building was planned, and to some considerable extent completed, before the French architect appeared on the scene, or he must have accepted a design already prepared modifying it, only in smaller details, and confining the work of himself and his companions to such important features as the great portals.

The plan of Upsala consists of a nave, with aisles, transepts, choir and aisles, surrounded by five octagonal radiating chapels [Illustrn. viii]. Chapels were also formed between the buttresses of the aisles, and the western front was flanked by two towers. The whole is lofty and well-proportioned, and has a clerestory, an unusual feature in Swedish work—perhaps due to the suggestions of Estienne. The building, externally, was never finished as originally intended, but completed in brickwork, with gables,



FIG. 152.—UPSALA CATHEDRAL: CORBEL TO NICHES ROUND CHOIR.  
(From a photograph.)

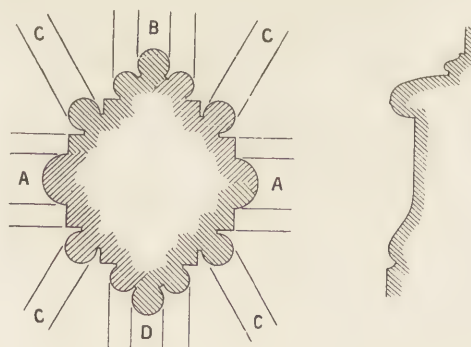


FIG. 153.—UPSALA CATHEDRAL: PLAN OF ONE OF THE NAVE PIERS  
AND SECTION OF BASE.

panels, and arcades in the later style, and the whole appears to have been reconsecrated so late as 1435. It has suffered much from fires and the subsequent repairs, and is now undergoing a complete restoration.

Of the iconography of the south porch there is little to say, as the original design has not been completely carried out. The tympanum itself seems never to have been



FIG. 154.--SKARA CATHEDRAL: WEST DOOR.

carved, but the lintel has the six days of the Creation in low relief enclosed in a series of quatrefoils. The arch of the porch contains two orders of figures: the one of the Apostles, and the other of the Patriarchs, all seated, with delicately carved canopies. There were two niches formed on either side of the door, but, if ever filled with figures, these have long since disappeared. All this work is executed in hard green stone; but the figure of St. Laurence, which is life-size, and stands on a pedestal between the doors, as well as some figures in niches on each side of the portal, are of slightly later date, and in soft brownish stone. There is a statue of St. Erik in the north portal, and of St. Olof in the west

portal. All the doors in these portals are thickly coated with narrow iron plates.

At Skara, the capital of Vestgotland, is one of the oldest cathedrals in Sweden, consecrated in 1151. Of the work of this date, however, but little remains except in the western towers, where there are some small two-light windows with baluster-shafts. The church is stone-built, with western towers, nave and aisles, transepts and apsidal choir, with turrets at the angles of the choir and transepts. The western towers, which



are very lofty, with buttresses of great projection, were built to receive, and have had recently added, lofty spires. The tower turrets occupy the unusual position of the west front of the nave flanking the western porch. This porch [fig. 154] and that to the north transept are of a simple and elegant design, deeply recessed, with a plain panelled tympanum, but with a corbel to receive a statue in the centre pier. The nave and aisles are vaulted with simple square vaulting, the rolls of the great piers passing above the caps forming the arches of the arcades and ribs of the vaulting. The south transept and choir have been pulled down for rebuilding, but drawings show the apse to have been a plain, straight-sided one, without chapels. The work generally may be assumed to belong to the last part of the thirteenth century, but there is but little carving or moulded work to enable one to fix a date.

Of all Swedish cathedrals, there is none more interesting than that of Linköping [Illustrn. viii, and figs. 155-158]. In dimensions it ranks second to Upsala, but far surpasses it in interest and the beauty of its details. It has grown up piecemeal like an English cathedral; but all the work is the best of the several periods at which it was erected, and there is nothing discordant or disproportionate anywhere to be found, if we except only commonplace and entirely modern work of the west end, and some of the smaller external restorations on the south side.

It is entirely constructed of a limestone, inside and out, except possibly some of the filling-in of the east-end vaults, and the interior is of a warm grey colour, relieved by the light and shade of the rich arcading surrounding the walls and the profusion of carving to be found everywhere. It is said to have been founded about 1150, and the bishop for some time disputed for priority with the bishops of Upsala. The building, apart from the modern additions, appears to belong to four distinct periods, the oldest being the transepts and crossing of the



FIG. 155.—LINKÖPING CATHEDRAL: WALL-ARCADE, EAST END OF NORTH AISLE.



choir. The arches here are semicircular, resting on massive piers with angle shafts, and have half-cylindrical columns; all is vaulted in plain vaulting, and looks as

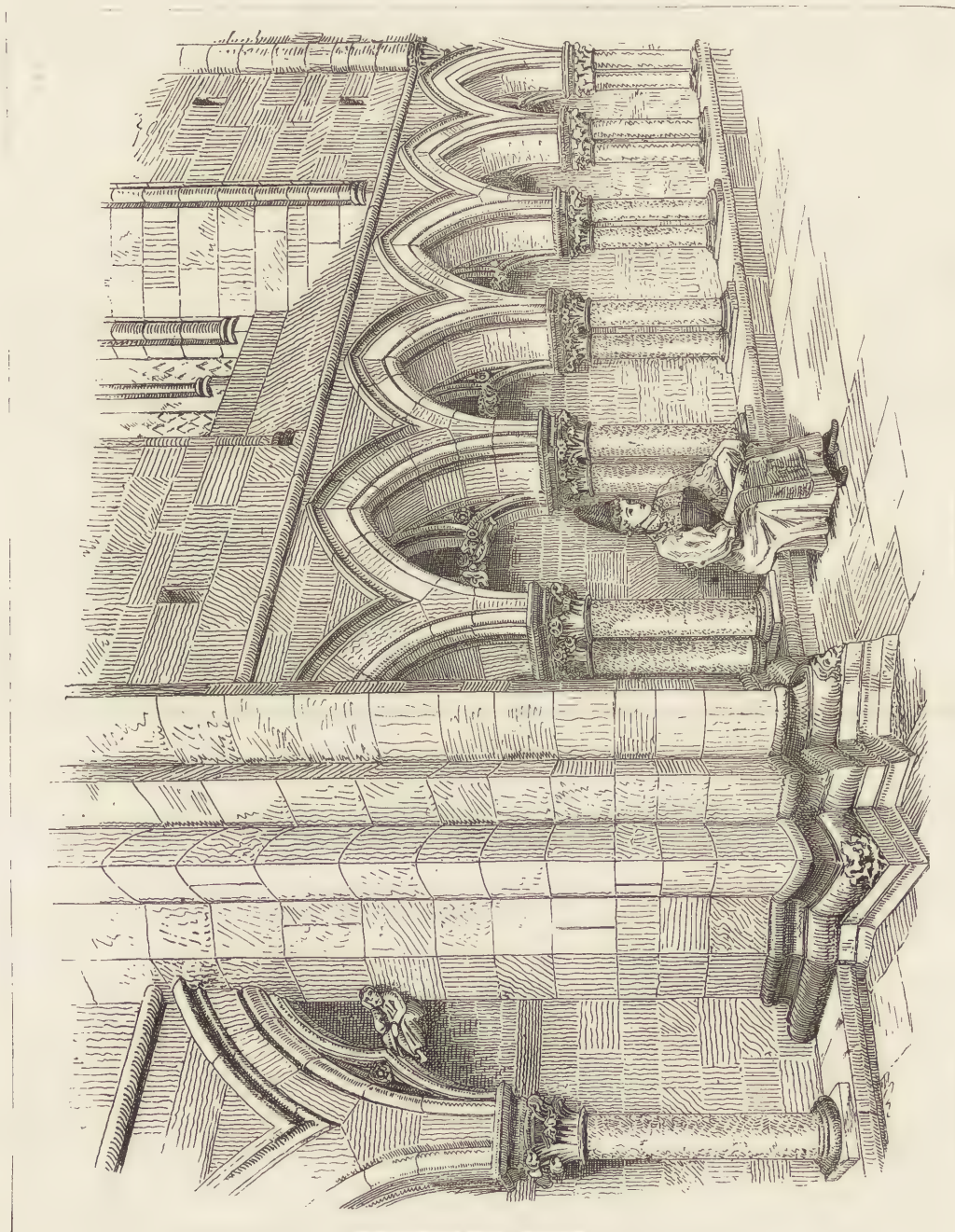


FIG. 156.—LINKÖPING CATHEDRAL: WALL-ARCADE, WEST END OF NORTH AISLE.  
(From a drawing by Mr. J. Tavenor Perry.)

if prepared for a central tower. The transepts have similar arches, but pointed; and the corbel tables on the face of the transepts, and the north transept door, all



appear to belong to the same period, which may be that of the date given for the foundation. There would seem to have been a nave and aisles of the same date, westwards from the transepts, as a half-column still remains on one of the piers ; whether this nave was built and pulled down, or the scheme abandoned, I do not know ; but at a date early in the next century the present nave must have been begun, the work being started from the transepts westward. The first and second piers on each side of the nave were in pairs, plain cylinders and octagons, and the rich wall-arcades in the north and south wall are circular-headed [fig. 155]. For this rebuilding, the nave and aisles had been set out to be nearly of the extreme width across the transepts of the old church. The progress of the work during the thirteenth century does not appear to have been abruptly stopped, but must have spread over a long period, as at the west end of the nave the work is as late or later than any of the work at Upsala. The wall-arcading in the third bay westwards becomes slightly pointed, although with the same details ; but in the fifth and sixth bays it is boldly pointed and richly moulded and carved [fig. 156] ; while the remaining piers and the vaulting become more intricate, though still of the best and purest character of First Pointed work as practised in Sweden.

Whether there was at any time an apse as an eastern termination to the cathedral, there is nothing to show ; but the smallness of the present choir and some of the peculiarities of setting-out which are perceptible at the east end make this probable [fig. 157]. At all events, late in the thirteenth or early in the fourteenth century a new choir with chapels was begun. There is much in the character of the mouldings and work generally to suggest that here the Estienne of Paris and Upsala had some control ; but if this were so, he could scarcely have had anything to do with the plan, which is as unlike a French arrangement of the chapels as can well be imagined. There are three chapels radiating from the east end, which is finished octagonally, with unequal sides, the centre one being much narrower than those at the side, and the two side chapels being also slightly wider than the centre one. This work at the east end had not risen very high from the ground when the work appears to have been stopped ; and when resumed later the whole character of the design was altered, and the work dragged on for many years while the vaults were being raised ; but the work was quite completed in 1499, as shown by some of the dates on the roofs. It may be interesting to add that the floor of the nave falls from west to east nearly eighteen inches ; and the eastern chapels are one step lower than the choir aisles. The floors appear to have been laid to the natural levels of the land.

I have mentioned that the ornamentation and sculpture in this cathedral are particularly rich. There is a great deal of nailhead ornament in the earlier arcading, and the pointed wall-arcades have their cusps all elaborately carved, chiefly with figures full of vigour, and all the capitals with excellent foliage. Wherever, throughout the building, carving could be introduced, it has been lavishly used. The richest portion of all, however, was the great south portal, now altogether rebuilt and recarved, but of which considerable remains are stored in the church ; whilst a statue of St. Peter, life-size, which appears to have stood in the central pier, is now embedded in a buttress



on the north side of the choir externally. There is an interesting series of windows remaining on the north side of the church, showing the progress of the style during

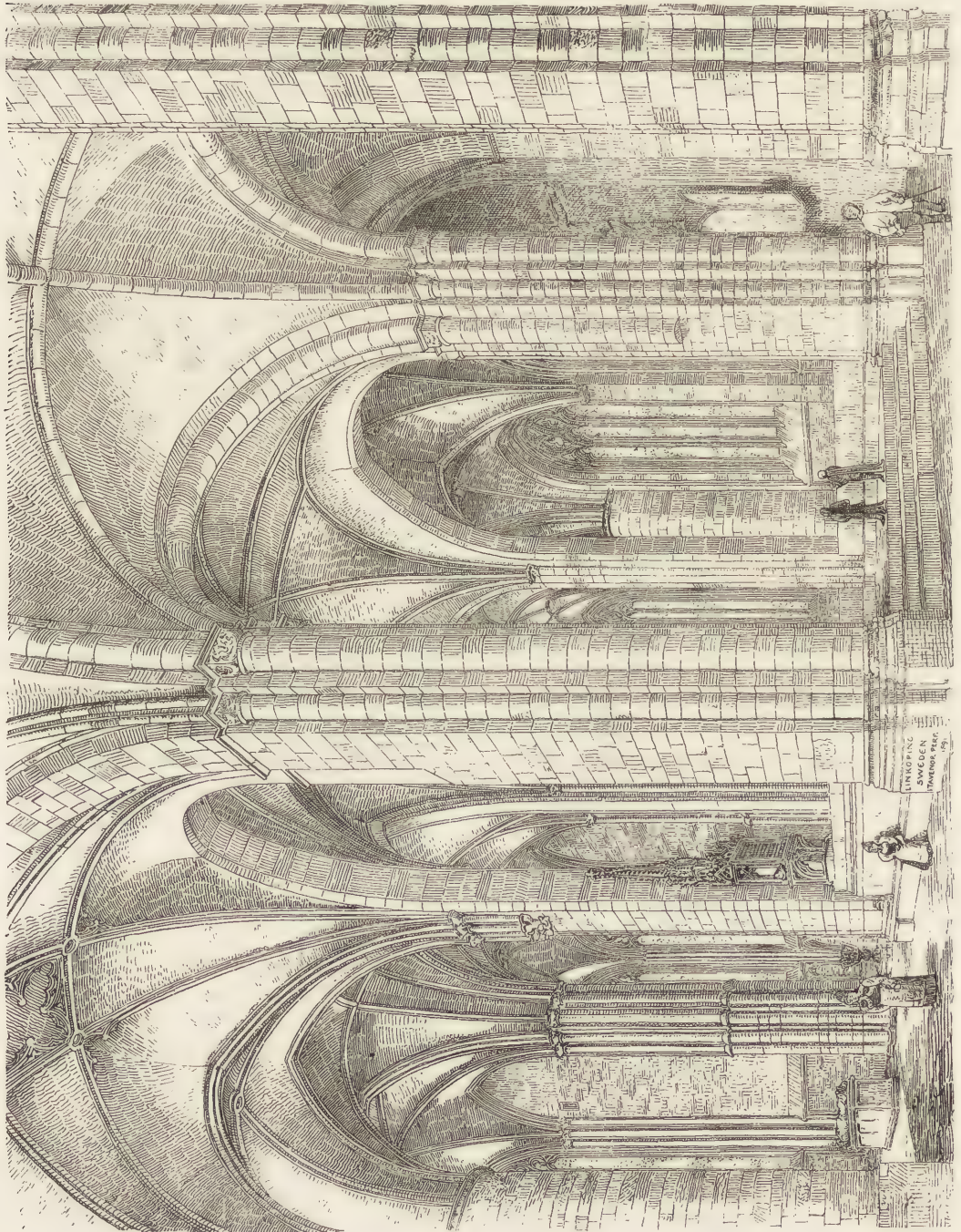


FIG. 157.—LINKÖPING CATHEDRAL: THE CHOIR FROM THE NORTH TRANSEPT.

(From a drawing by Mr. J. Tavenor Perry.)

the rebuilding of the nave. Those in the transept are triplets with banded shafts and



nailhead enrichments that would not surprise one in an Early English church, while the last has completed geometrical tracery [fig. 158].

The Church of St. Nicholas at Örebro is a fine, stone-built, cruciform church, measuring without its western tower about 110 feet by 54 feet over all [Illustn. viii]. With the exception of a chapel to the north of the transepts and the western tower, both of which are later brick additions, it might in all its details pass for an English church of the latter part of the thirteenth century ; but in some arrangements of its construction



IN NORTH AISLE, NEXT TRANSEPT.

IN NORTH TRANSEPT.

FIG. 158.—LINKÖPING CATHEDRAL : WINDOWS.

(From drawings by Mr. J. Tavenor Perry.)

it presents local features. The church is vaulted throughout with plain stone vaulting, the two transepts, which do not project beyond the line of the aisles, being covered with barrel-vaults, and the buttresses of the nave aisles do not coincide with the arches of the vaulting. The fine south porch [fig. 159] \* has an extremely English appearance, and Sir Arthur Blomfield suggests that a great likeness exists between it and the destroyed south porch of St. Mary Overie's, Southwark. This church in its unrestored state was slightly described in *The Ecclesiologist*,† but the suggestion therein made that it was built by some Lübeck merchants in the middle of the twelfth century is manifestly incorrect.

\* See *The Priory of St. Mary Overie, Southwark, &c.* By Francis T. Dollman. Fo. Lond. 1881. Plates 6 and 15.

† See *The Ecclesiologist*, 1847. Vol. 4, New Series, p. 189.—J. T. P.





FIG. 159.—ST. NICHOLAS, ÖREBRO: SOUTH PORCH.

(From a drawing by Mr. J. Tavenor Perry.)

I have dwelt at such length on the stone buildings—which are undoubtedly of the greater interest, as presenting distinctive features of style not to be found in the brick



ones—that I have comparatively short time to describe these latter; but for the peculiarities of this class of building I would refer you to the Paper I read here many years ago on “The Mediæval Brickwork of Pomerania,” for there is but little difference in this style of work as practised all round the coasts of the Baltic Sea.\* The illustrations of details from churches in Stargard and Stettin [figs. 160, 161] show the character of the blank tracing used in the arcading and the arrangement of the bricks at the angles, producing an effect perhaps peculiar to the Baltic work.

The most important of the brick-built cathedrals of Sweden is the great church of Åbo, in Finland. It was begun in the middle of the thirteenth century, and was originally finished with a square east end. It has suffered frequently from fires, and the great one which destroyed the city of Åbo early in this century almost completed the destruction of the church. So entirely have these disasters obliterated all trace of antiquity, that, except the solid mass of the walls and the great tower, little remains of the ancient building to interest an architect, or even an archæologist. As it stands it consists of a nave and choir without transepts, about 300 feet long, three extremely lofty aisles about 130 feet across, and a massive western tower. The aisles are all vaulted in brick; and the centre one, but slightly higher than



FIG. 160.—ST. MARY, STARGARD, POMERANIA:  
EXTERNAL ARCADING.

the others, has a small clerestory of circular windows. The western tower [fig. 162], raised in three stages, but unbroken by any set-offs or moulded string-courses, is the most interesting part of the building remaining. The lowest part is of granite, which for half its height is almost unhewn and placed random. This part seems never to have been pierced by a western door until modern times. Above the granite rises a stage of brickwork, which, with the turrets and gables above, together with, in all probability, a spire, was built about 1421 by Bishop Tavast. Above all this, at a

\* See TRANSACTIONS, 1873-74, pp. 15-31.

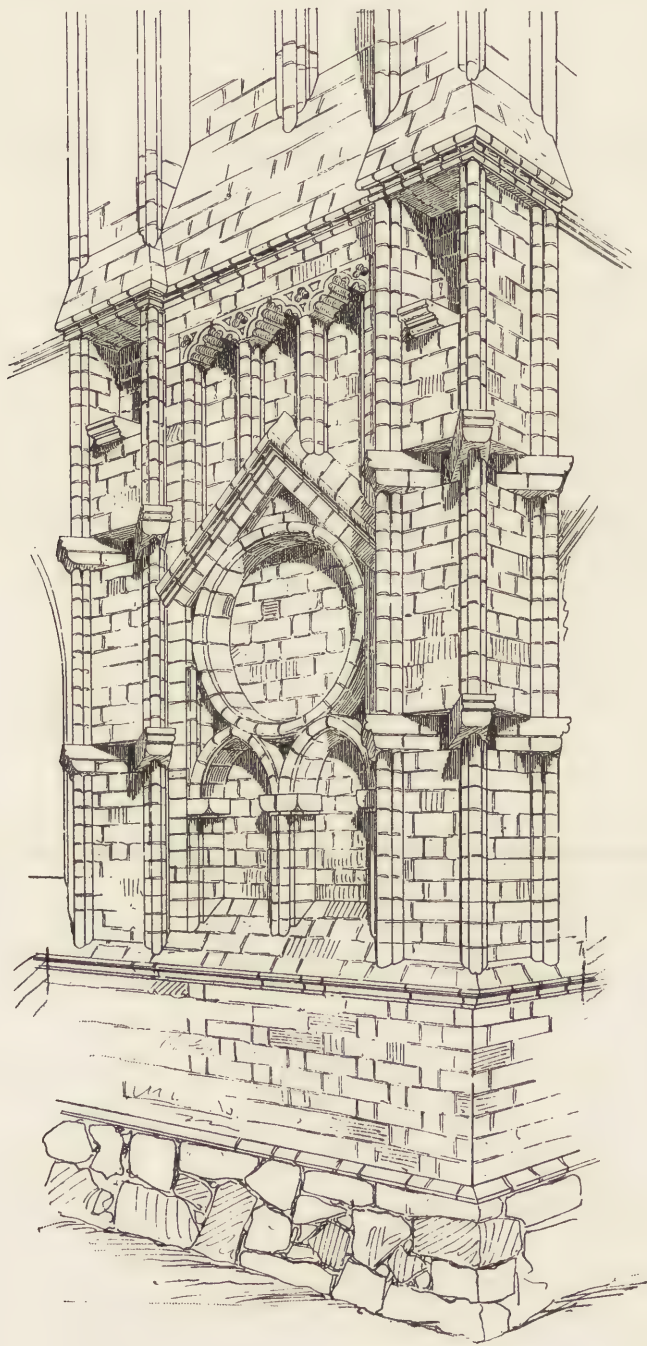


FIG. 161.—ST. JAMES, STETTIN, POMERANIA: BRICK ARCADING.  
(From a drawing by Mr. J. Tavenor Perry.)

later date and after the destruction of the spire, was raised another square mass of brickwork, which is now surmounted by a modern copper *fèche*. Through the later brick additions, the parapets and gables of Bishop Tavast's work still clearly show; and from it can be seen that although the details were those common to the brick architecture of the Baltic, the grouping was unusual, reminding one of the spire of St. Patroclus at Soest.

The more ancient church of Rântämäki, which was the seat of the first bishops of Finland before the founding of Åbo, has the wall mainly of granite roughly hewn in enormous blocks, but the upper parts of the building and the interior are of brick. From the plan [Illustn. viii] it will be seen that it is a square-ended building in three aisles, with a western tower and a large south porch, entered only on the east and west sides. The low western tower which forms the belfry is partly of wood, and is entered by a small wooden turret on the north side [fig. 163].\*

\* A further account of the history of the buildings in Finland is published in *The R.I.B.A. Journal* of the 23rd October 1890 [Vol. VII. N.S. p. 4], from the pen of the author of this Paper.





FIG. 162.—ÅBO CATHEDRAL, FINLAND: WESTERN TOWER.

(From a drawing by Mr. J. Tavenor Perry.)

The cathedral of Vesterås is said to have been founded as early as 1100, but there is no portion of the existing church so ancient. It is a five-aisled building,

X X

ending in a polygonal apse that does not properly fit on to the rest of the building. The aisles [Illustrn. viii] are of various widths, but of equal height, except a small part



FIG. 163.—RÄNTÄMÄKI, FINLAND; THE ORIGINAL CATHEDRAL OF ÅBO.

of the west end of the nave, which is slightly lower, and is the most ancient part of the building. Restorations here have effaced almost every indication of date.

More interesting than Vesterås is the small cathedral of Vexio, which I place among the brick buildings, for it is now impossible to say of what the old walls consist, as they are coated with plaster inside and out;

but the vaulting and the gables of the aisles and tower are of brick. It is a three-aisled church of a uniform height, with chancel projecting one bay, ending in a square east end, and with a large massive tower on the west front [Illustrn. viii]. The gables are in the Baltic style; but how far Professor Brunius, who restored the church, had authority for them, I cannot say.



FIG. 164.—GREYFRIARS CHURCH, YSTAD.

Besides these cathedrals there are other large and important churches, particularly those of Ystad and Malmö, worth noticing. At Ystad [Illustrn. viii, and fig. 164] is a conventual church; with, on its north side, considerable remains of the convent of the Grey Friars. The church consists of an early nave of three vaulted



bays with stone arches, a late brick south aisle, and a vaulted chancel of two bays ending in a half-hexagonal apse. The vaulting ribs and the small corbel columns from which they spring are quite English in character [fig. 165]. At Lund the Klosterkyrka is somewhat similar to this choir, and ends in a similar apse [fig. 166]. There are considerable remains of coloured decoration on the vaulting of the nave at Ystad. St. Peter of Malmö is a large building of three aisles, transepts, and apsidal choir

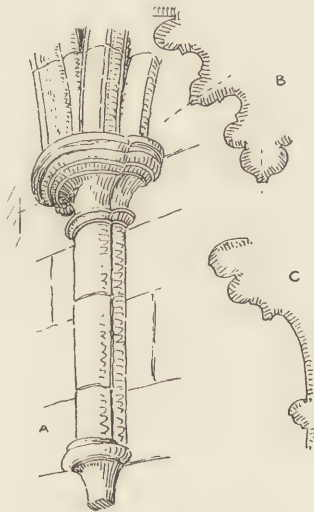


FIG. 165.—IN THE CHOIR OF GREYFRIARS CHURCH, YSTAD.  
A, Corbel. B, Vaulting-ribs. C, Capital.



FIG. 166.—LUND:  
KLOSTERKYRKA.  
Scale about 64 ft. to 1 in.

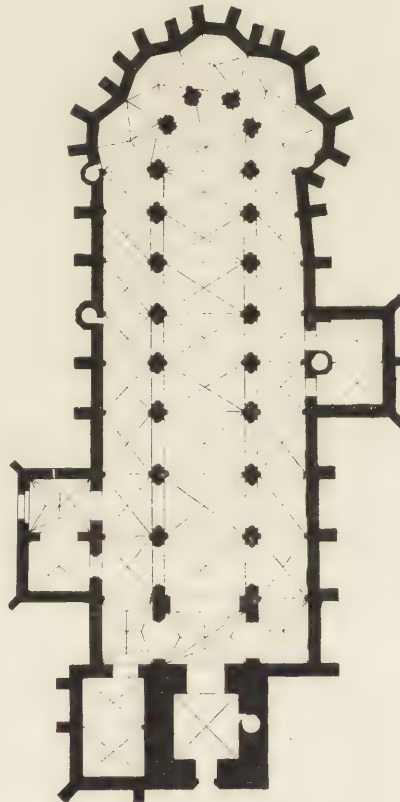


FIG. 167.—ST. PETER, MALMÖ.  
Scale about 64 feet to 1 inch.  
From Brunius.

with chapels, and a lofty western tower recently crowned with a new spire. In the setting out, the choir has been made to lean considerably to the south, and the north and south walls are not parallel. Whether this was purposely done or not, the effect is very evident in the exterior, and is most unpleasant [fig. 167]. The interior, which is lofty, has been plastered throughout, all the pier and arch mouldings having been run in cement.

Although there were a great number of circular churches in Sweden and in the

islands around, one of which still remains at Solna, by Stockholm, and some few of the churches ended with a semicircular apse, I think the majority of the earlier churches had square eastern terminations. The early buildings of Röntämäki and Karins, near Åbo, are square, and this is the case with buildings of later styles, such as Örebro and Vexjö; but when and wherever German influence became predominant an apsidal termination was adopted. Where, as at Upsala or Linköping, they were set out in a correct and scientific way, the results were always pleasing; and even when they were executed carelessly, as at Vesterås or Malmö, they were generally picturesque; but when, as in the smaller buildings, they became reduced to the invariable half-hexagon—which is the traditional shape for the end of all modern Swedish churches—a form was produced neither satisfactory from the internal nor the external point of view. In the setting out of the radiating chapels of Malmö, except for the southward inclination of the choir, the Dom at Lübeck appears to have been followed; but as authorities for the chapels of Upsala and Linköping I am unable to point to actual German examples, but can certainly say that they are not at all French.

Another noticeable peculiarity is the omission of the clerestory, or at least its reduction to the smallest dimensions. Only in Skara and Upsala, of the earlier stone churches, and Malmö, of the later brick churches, does it appear of anything like adequate size; whilst at Åbo the windows are so small, and separated from the aisles below by so great an area of walling, as to be useless for the purpose of lighting the church. I am inclined to think that one reason for this omission, apart from German influence in the matter, was the desire to simplify the roof as far as might be, and afford as few weak places for the snow as possible. One result of this has been, that although in the best work some difference has been made in the height of the aisles proportionate to their width, as at Örebro and Linköping, as a rule the aisles, whatever their width, were all carried to the same height. In the two Finnish churches of Röntämäki and Nådendal, however, the aisles are all of equal width, and vaulted at the same level. The consequence of this omission of the clerestory was a great want of light in the interior of the churches, and one result of this was the extreme simplicity but boldness of the mouldings used in the interiors, except at the east end of Linköping. Rolls and pointed bowtels were used for the vaulting sometimes, as at Ystad and Linköping, banded at intervals; and the bays were separated by flat, unmoulded, or only chamfered arches. The piers were but little broken up, the capitals simple, or very boldly carved, but the bases were the most ornamental parts. These were generally raised high above the floor, with carved claws, and surrounded by broad stone moulded seats, as at Örebro, Skara, and Linköping.

In the earlier churches the porches were of great extent, and were provided for the accommodation of the weapons the worshippers carried with them for their safety whilst within the church. This made the church porch a most important feature, and to this may be due the fact that during the best architectural period the portals were very considerable and treated with a great deal of ornamentation. Those of Upsala, Skara, and Linköping I have particularly mentioned, and you will see from



that of Örebro that it is much more important than is the case in an English church of the same size.

The dangerous condition of the open country rendered the walling-in of the churchyard from foes and wolves a necessary precaution; and cathedrals and churches alike were always enclosed by lofty walls protected by gates, with towers over them in more important places. There are accounts of more than one siege which the cathedral walls of Åbo had to withstand, and in the turbulent condition of the country in mediæval times many churches were used as fortresses.

Bells were always held in great esteem in Sweden, and all churches were provided with them; but as towers to the smaller churches were uncommon, the belfries were generally detached wooden erections, sometimes a mere scaffolding, generally a closed tower built of heavy logs of timber covered with shingles, and fitted with shutters to open during the bell-ringing. The lower part of the enclosed towers was also frequently used in winter as a temporary resting-place for the dead until the frost broke up and permitted the graves to be dug. There are large numbers of these towers still standing all over Sweden, and I brought back sketches of those remaining in Stockholm and Gamla-Upsala.

Frequent wars and fires have pretty well denuded the churches of furniture and fittings. Elaborate stalls [fig. 168] remain in Lund Cathedral, and small portions at



FIG. 168.—LUND CATHEDRAL: CHOIR STALLS.

(From a photograph.)

Vesterås, Dalby, &c. Several fine and important late German triptychs are to be found about the country. There are three large ones carved and gilt in Vesterås. There is an elaborate one in the small apsidal church of Arboga; and a great one, with the shutters painted, was only recently removed from the altar to the south aisle at Linköping. At Lund Cathedral there are some fine bronze candlesticks of the thirteenth century, one with seven branches, but they were all to pieces under repair on my last visit. At Vesterås there is a good bronze knocker on a door taken from another church. Of church plate there is not much left, but at Örebro is a fine fifteenth-century enamelled and jewelled chalice; while at Upsala there are numerous crowns, sceptres, and other goldsmith's work, besides some rare vestments.

At Linköping there is a small, but elaborately-carved stone *Sacramentshaus* standing within the choir to the north of the altar, which can be seen in my view of the interior [fig. 157].

Of fonts there is a vast quantity, nearly all of an early date, and generally of most elaborate design; though in the larger churches they are often not to be found, as baptism, according to the modern Swedish ritual, is generally administered in the private house. Thus many fonts have drifted into museums, and those which were spared at the destruction of some of the smaller churches have been stored in the surviving churches; thus, at the small village of Stenstorp I found, and sketched, two good fonts of early date standing as vases for ornament outside the church door [fig. 169]. The rite of baptism was held in the highest regard by the early Swedish Church, and elaborate rules were laid down for its administration. It was considered of great importance that pure fresh water should be used. The wells in crypts, like those of Dalby and Lund, were held in great esteem, as the water therein did not freeze; but as water unfrozen was difficult to obtain in winter, the rubrics provided that, failing pure water, dew could be used, failing which snow, and failing any of these, sea-water. It will be seen from my sketches of the fonts of Tryde, Dalby, &c. [figs. 170, 171, 172], that these fonts were most beautifully carved, and that the late one in bronze from Linköping was quite equal to German work, which perhaps it really was, and not unlike that in the Dom of Lübeck. Of this font, as will be seen by the illustration [fig. 173], only the bowl remains in bronze, the feet and pedestal being made up of stone fragments of earlier date. The cusping or other ornament round the lower part of the bowl is broken away, and it may have been finished with supporting figures like that of Lübeck, which in all other particulars it so closely resembles. The nimbi, which are absent in the Lübeck example, are here engraved on the surface of the bowl behind the heads of the figures. Salt was an essential to the baptismal ceremony, and some early fonts, as figured in a Paper by Herr Montelius,\* were provided with a salt-cellar carved in the foot.

It is necessary to say a few words on the restorations of Swedish buildings which

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\* O. Montelius, *Bidrag till kännedom om Göteborgs och Bohusläns fornminnen*, p. 438, fig. 8; p. 442, fig. 11. 8o. Stockholm, 1877.



have been going on for many years past, and are proceeding with vigour now at Upsala, Skara, and Malmö. The work at Linköping has been mainly confined to the building of



FIG. 169.—STENSTORP CHURCH: FONTS OUTSIDE SOUTH DOOR.



FIG. 170.—TRYDE CHURCH: FONT.

Height, 3 feet; width, 2 feet 2 inches.



FIG. 171.—DALBY CHURCH: FONT.

Height, 3 feet 6 inches; width, 2 feet 9 inches.

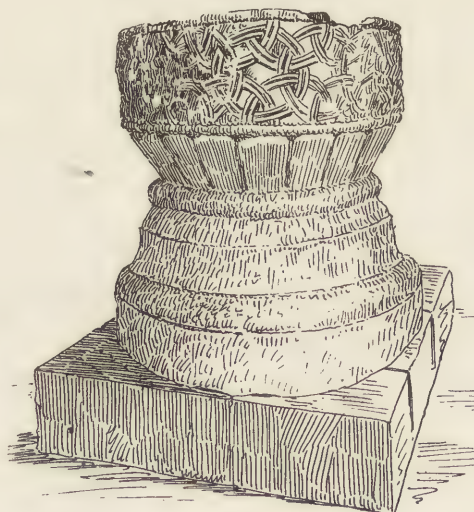


FIG. 172.—FONT FROM TVERREO CHURCH, NOW IN THE MUSEUM, GÖTEBORG.

Height, 3 feet; width, 2 feet 2 inches.

a new west front, of the poorest description, with a lofty gabled spire which dwarfs the rest of the building. For this west front there was absolutely no authority whatever,

as the old prints show a large rose and other traceried windows in the gable, and it would appear that the intention was to flank it with two small towers or turrets. The new carved work of the south porch is also very tame, and this remark applies as well to the carving of Örebro, where otherwise the work seems to have been carefully done.

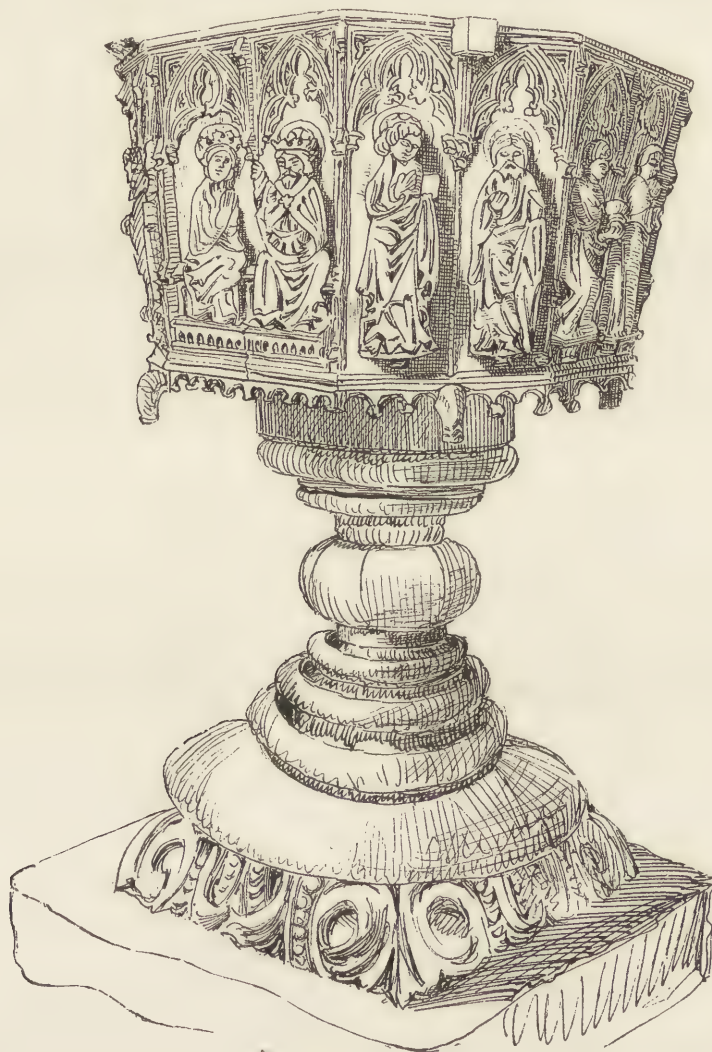


FIG. 173.—LINKÖPING CATHEDRAL; BRONZE FONT.

Height of shaft, 2 feet 3 inches; height of bowl, 1 foot 9½ inches; width of bowl 3 feet 1 inch.

(From a drawing by Mr. J. Tavenor Perry.)

It was difficult to judge of what was going on at Skara, but, from a comparison of some old drawings with the work already completed, I should think the work was being conscientiously carried out. Upsala Cathedral was never finished, at least externally, and much of the original work had been destroyed by fires and rebuilding; but there was enough evidence remaining in the delicate mouldings and carving of the porches,



in the stone window jambs, and other parts of the exterior, to show the character of the intended completion. But when I tell you that the external work has been formed in concrete, that enriched cornices, gargoyles, pinnacles, and open parapets are all cast to pattern in cement, and that these, with two meagre cast-iron spires at the west-end, now crown the church of Upsala, you will agree with me that it is possible for a worse fate than fires and neglect to overtake an historic building. To concrete as a building material legitimately used there can be no objection; and there is in Stockholm a recently erected church, of red brick, in which all the work usually done in stone, except the carving, is in concrete, the effect of which is good, and certainly better than cheap and common terra-cotta.\*

In conclusion, I have to thank you for listening so patiently to such a dry catalogue of buildings and effects; but I hope, by placing this Paper in the records of the Institute, that some assistance will be rendered to those architects who may be, as I was, induced to visit Sweden for purposes of study.

J. TAVENOR PERRY.

#### NOTES ON THE FOREGOING PAPER.

Mr. R. Herbert Carpenter, F.S.A., *Member of Council*, who joined in the short Discussion of this Paper [see verbatim report in *The R.I.B.A. Journal*, Vol. VII., pp. 366-367], has since contributed the following notes on the Cathedral of Upsala:

In Upsala Cathedral, although there were many English clergy in Sweden, we find no traces of English architects and masons having been employed, as was the case at Thronðjhem (and in Norway generally), century after century—Englishmen having been brought over from England, chiefly perhaps from Yorkshire and Kent, to erect the great “Christchurches.” Perhaps an explanation is that the Swedes accepted as their model that Götland type of church erected by King Olaf in the eleventh century, such as now exists in the island of that name, which in many respects resembles the early work of Linköping Cathedral, reminding one both of the German Romanesque and the French Angevin styles. If it was so, one can easily understand the fact of a French architect having been summoned to assist in the building, on the “Mons Domini” at New Upsala, of a worthy successor to the famous temple of Woden at Gamla-Upsala. This external help was probably necessary in designing a church of such magnitude, and the plan seems to me (though Mr. Perry is of a different opinion) to be essentially French rather than German.

I feel, however, with him difficulty in attributing the thirteenth-century design as a whole to Estienne de Bonneuill; but I think he does not allow sufficiently for the evidently slow progress made, which makes it to my mind very probable that Estienne took up and modified the design of a countryman of his own at an early stage of the work. Even then the after progress was so slow that the French design was never completed. For instance, the piers of the arches into the nave chapels, though they have very beautiful bases, have no capitals, such as are found in the case of the piers of the western towers alone.

A great attraction to Upsala Cathedral is the treasure contained in its strongly barred sacristy. Amongst many articles of priceless value is a magnificent golden chalice, of exquisite design, mounted

\* This is the church of St. John, Stockholm, executed from the designs of Mr. Carl Möller, architect.—J. T. P.

with pearls and diamonds. It is said to date from 1541, but appears much earlier. There are many other rich chalices and candlesticks, and two very beautiful enamelled crowns and sceptres of King John III. and Queen Catherine Jagellonica; also a magnificent enamelled coffer, which had contained briefs for indulgences, and a cross of silver gilt, jewelled, given by Pope Alexander III. to Stephen I., Archbishop of Upsala in 1160, containing a relic of the "True Cross."

There is also a rude wooden figure, said to be an idol representing Thor, brought from Old Upsala, though it is much more likely to be an early Christian figure; and the collection of ancient vestments is very fine, including many altar frontals and chasubles of the fifteenth century and earlier.

On the north side of the High Altar is the original shrine of St. Erik, 1160, the patron saint of Sweden, which is in the form of a sarcophagus, of silver gilt, covered with rich ornament; and there are many tombs, but none of much artistic merit, except that of King John III., 1592, and that of King Gustavus Vasa, 1560, whose recumbent figure lies between those of his two wives in the old Lady-chapel, the walls of which are covered with modern paintings, and the windows filled with indifferent English stained glass.

R. HERBERT CARPENTER.

The Rev. F. H. Woods, B.D. Oxon., who also joined in the Discussion, has since written as follows:

The timber churches of Sweden are, it is true, not so numerous or nearly so striking as those of Norway, but one or two are worth inspecting. The church of Råda, in Vermland, is externally an extremely plain structure, modern in appearance, though not in reality; but internally the walls, and the roof, which is of the trifoliated barrel-form, are decorated with paintings. The church is of the thirteenth century. There are also interesting paintings at Vadstena and Risinga, in Östergötland. The *klockstaplar*, or wooden bell-turrets, detached from the churches, are very frequent, and often most picturesque. The existence of one close by the ruined monastery of Nydala, in Småland, shows that some of them at least are ancient, though their peculiar construction and the lack of characteristic ornament make it almost impossible to date them. The excellence in wooden carving and decoration is also attested by the triptychs still existing in many village churches. They are frequently to be found broken and thrown away in some corner, to make way for the severer taste of a later age. Many have, like the fonts alluded to in Mr. Perry's Paper, found their way into the museum at Stockholm. This plan of removing church ornaments into museums is, from many points of view, most deplorable; to say nothing of religious feeling, it mars the archæological interest by dissociating the object from its locality and its purpose. Another object of great beauty and interest is the silver shrine of St. Erik in Upsala Cathedral. If, taken as a whole, the country of Sweden, compared with other European countries, is somewhat barren in architecture, this certainly cannot be said of the island of Götland; both its capital, Wisby, and the surrounding villages are full of very beautiful churches, many of them unique in character. A valuable little book on Swedish ecclesiastical archæology is Dr. Hildebrand's *Ten Kythliqa Konsten under Sveriges medeltid*.

F. H. WOODS.



LXXXVII.

A TOUR IN THE UNITED STATES.

By A. ARTHUR COX, *Associate, Holder of the Godwin Bursary.*

[*Addressed to the Council.*]

MR. PRESIDENT AND GENTLEMEN,—

IN compliance with my undertaking as Holder of the Godwin Bursary for the year 1890, I have the honour to submit a report on modern methods of building, construction, sanitation, ventilation, lighting, steam and other modes of heating, fireproof construction, and planning of some of the principal buildings, with their respective arrangements and finishings, as noted by myself during a professional tour through a portion of the United States.

On 16th April, 1890, I left England by mail steamer, and arrived in New York on the 23rd of the same month; from that date until 18th August I was engaged visiting the following cities\*: New York, 26 days; Brooklyn, 3 days; Philadelphia, 4 days; Balti-

\* The principal buildings visited and subjects deemed worthy of my notice are:—

*New York.*—Union Trust building; West Union Telegraph building; Produce Exchange; Chelsea Flats; New York Academy of Music; Vanderbilt residence; Madison Square Amphitheatre, during course of construction; *New York Times* building; Grand Central Depôt; Bank building, Wall Street; sundry dry goods stores; New York Hospital; St. Joseph's Hospital; the Century Club; Custom House; Manhattan Athletic Club, during erection; the *World* building, during erection; Post Office building; the City Hall; Merchants' Exchange; the Cooper Institute; Museum of Art; Casino Theatre; Proctor's Theatre; Broadway Theatre; Stock Exchange; the *Tribune* block; Windsor Hotel; Murray Hill Hotel; Imperial Hotel; Grand Central Hotel; Dr. John Hall's church; Bruce Library; Astor Library; Columbia College buildings, especially as regards the library and its internal fittings; the Croton Reservoir and new Aqueduct; the Equitable building, especially to examine plumbing, heating, and electric lighting; sundry private residences on River Side Drive, and other buildings in course of erection; block of offices constructed entirely of "Gustavino" fireproof material; the Westinghouse Electric Lighting Company's works, and three lighting stations with plants in operation; twenty-nine interviews with architects, going through their offices and inspecting drawings in preparation for new buildings, including a large country mansion to be erected in New California for G. W. Vanderbilt, Esq., the architect for the latter being W. W. Hunt of New York; also consultations with W. Thomas Brady, the superintendent of the Bureau of Inspection of Buildings, and with the chief inspector of plumbing of the Health Department, upon questions of laws relating to the erection of buildings and sanitation in the city of New York.

*Brooklyn.*—The City Hall; Brooklyn Library; County Court House; Municipal buildings; Pratt Institute.

more, 10 days; Washington, 3 days; Pittsburgh, 4 days; Cleveland, 5 days; Chicago, 6 days; Detroit, 4 days; Niagara Falls, 1 day; Buffalo, 1 day; Albany, 3 days; Boston, 6 days; 76 days actually engaged on buildings and in interviews with archi-

*Philadelphia.*—City Hall building, now in course of erection; Builders' Exchange Office; the Drexel building; the Y.M.C.A. building; Sprekel's sugar refinery; Presbyterian Children's Hospital; Girard College buildings; Old Court House; the United States Mint.

*Baltimore.*—Offices of P. & O. Railway; the Rennert Hotel; Peabody Institute; the Pratt Library; the City Hall; Lexington Market; Cotton Mills; Post Office building; Union Railway Depôt; John's-Hopkins Hospital; first Methodist Episcopal Church, the Goucher Hall adjoining, and Women's College and Gymnasium.

*Washington D. C.*—The Capitol building; the White House; U. S. Treasury building; Patent Office; Department of Agriculture; Smithsonian Institution; Post Office; new Congress Library, now in course of erection.

*Pittsburgh.*—The new Court House; the City Hall and Post Office, in erection; sundry office blocks; Masonic building; new Post Office; Alleghany Free Library (Carnegie); natural gas and oil wells in the adjacent neighbourhood; private residences.

*Cleveland.*—New Bank building; the Y.M.C.A. building; City Hall; Garfield Memorial; private residences; framed structures, school buildings, and their fittings; the public library, general notes on construction and arrangements of school buildings; visited several new grammar schools with Mr. Dunn, the superintending architect to the Ohio Board of Education; also visited the art studio of Mr. Schofield, designer and modeller of the new monument to be erected in Cleveland; interviewed Mr. Day, the chief superintendent of the Education Department on school order and general regulations.

*Chicago.*—The Rookery building; the Auditorium building; the Tacoma building; the Chamber of Commerce; the First National bank; the Water Works buildings; block of offices in course of erection by Messrs. Hale; City Hall and Court House; the Board of Trade; Exposition buildings, constructed in iron and glass; public library; passenger elevators, their construction, fittings and use, indicators and methods of working; foundations of buildings, and general methods adopted by architects of surmounting the difficulties arising from the unsuitable nature of ground under the footings of large buildings.

*Detroit.*—The State Savings Bank; Calvert Lithographic Works; Hotel Cadillac additions, special notes on plumbing and iron construction; private residences; churches; the City Hall; Grace Hospital; Public Library; sundry general constructive notes.

*Albany.*—The new Capitol building, partially finished; City Hall, law schools, Y.M.C.A. building; free library; private residences; the new viaduct, and general constructive notes.

*Boston.*—The Institute of Technology; the Art Club; the Athletic Club; Hotel Victoria; new Public Library; State House; Museum of Arts; City Hall; new Post Office and Sub-Treasury; private residences; Cambridge University buildings; attended testing experiment of "Gustavino" fireproof arch construction at the Public Library; general notes of construction.

In addition to the foregoing, I have interviewed thirty-six architects, nine superintendents of buildings, and eight plumbing inspectors, upon matters directly connected with each of the respective departments. These particulars will show that my tour covered a large area of country, and it is possible only for me to refer in a somewhat superficial manner to the subjects selected from the great variety and numerous examples found in the cities visited. The facilities with which I was favoured for access to some of the chief buildings named in the report were given by architects, but in more than one instance I received marked attention from gentlemen who were non-professionally interested to a greater or less degree in the art of architecture and construction. It will be unnecessary to give a list of the persons who thus rendered me so much information, but to each and all I feel indebted for their kind and ready response to all my enquiries, through which my tour has been relieved of much difficulty and delay, and the pleasure and profitableness to myself increased. My thanks are therefore due to those gentlemen and colleagues who generously aided me in my professional mission. I have endeavoured as much as possible to confine myself to notes on the construction of buildings during their progress of erection (many of which I visited five or six times), and in all cases rough sketches and notes made upon the actual works engaged a large proportion of the time placed at my disposal. Instead of making an exhibition set of drawings, or a collection of plans of buildings prepared by other architects, I have kept to details of construction, and taken fuller notes of materials and methods of the same as adopted by the best architects in the United States. In a few instances I have been favoured with copies of original plans of buildings, but in most cases I found my own rough sketches sufficient to convey the explanations necessary in this report. If the time had been appropriated to making complete sets of drawings, many of the more valuable notes on sanitary and plumbing matters would of necessity have been omitted, and it is for that reason that this report is illustrated with sketches drawn only to a small scale.—A. A. C.



fects, sanitary engineers, and others ; 11 days preparing fair sketches for report from own memoranda and general sightseeing ; 16 days were Sundays ; 20 days travelling by rail and boat ; total number of days, 123.

THE MANHATTAN ATHLETIC CLUB, NEW YORK.

The Manhattan Athletic Club, which is absolutely fireproof, is six storeys high, with a roof garden, covered by a high peaked tiled roof. The frontage is 125 ft. 10 in.



FIG. 174. —THE MANHATTAN ATHLETIC CLUB, NEW YORK.

on Madison Avenue, 115 ft. in depth on 45th Street, and 125 ft. on the southern side. A view of the exterior [fig. 174] is here given.

In describing the interior, I will go first to the lowest point of the structure, and proceed through the different rooms and departments to the highest point.

The sub-cellar, on 45th Street side, is taken up by the boiler and engine rooms. Here is the dynamo which furnishes electricity for 2,500 lights in the building, and

here also is located the large pump, which draws the water from the artesian well, at the rate of 100 gallons per minute, for all the usages of the building, except drinking. From the engine room the basement is reached by one flight of stairs. In the rear of this floor are eight regulation-sized bowling alleys. On the 45th Street side is the café and lounging place for bowlers. These alleys are so constructed that between each of them are platforms which will seat during match games a large number of spectators. In the front, and separated from the bowling alleys by a solid wall, is the swimming-bath, which runs parallel with Madison Avenue, and is 100 ft. long and 21 ft. wide. This superb plunge bath is 8 ft. deep at one end, gradually decreasing until it reaches the depth of  $5\frac{1}{2}$  ft. at the opposite end. Upon the platform, and between the bath and the division wall, are a number of dressing-rooms and several rubbing-rooms. On the south of the building, back of the swimming bath, are the Turkish and Russian baths, where the most approved system of bathing can be had; and at the north end of the swimming-bath, directly in front of the bathing

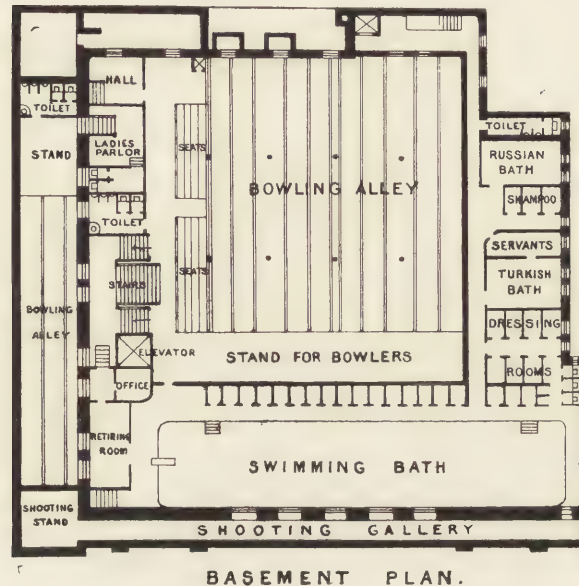


FIG. 175.—THE MANHATTAN ATHLETIC CLUB.



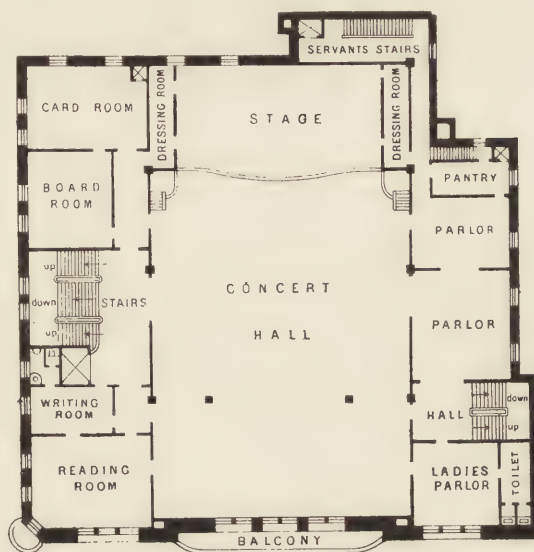
FIG. 176.—THE MANHATTAN ATHLETIC CLUB.

master's office, is a lounging space for the bathers, and through a door opening back of that is the shooting-gallery. This room, which is underneath the side-



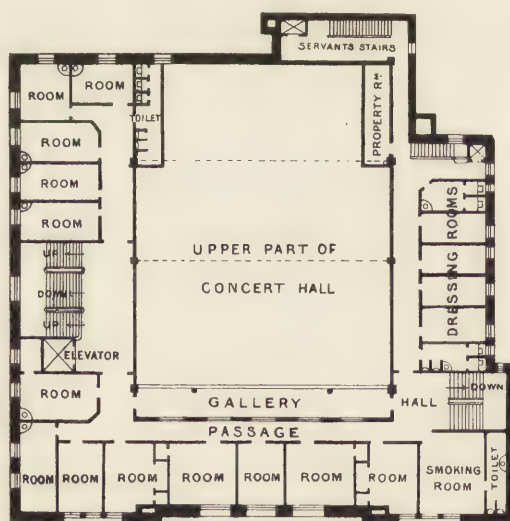
walk, has a magnificent range of 125 ft., with all modern improvements and conveniences [fig. 175].

Entering the building from Madison Avenue on the parlour floor [fig. 176] is found the reception-room. Continuing in the rear of that are the Club offices, the manager's room, an Otis elevator capable of carrying a load of 15,000 lbs., the grand staircase, and the café and grill-room. On the right of the entrance is the parlour, 62½ ft. long by 38 ft. wide, with five windows, each 6 ft. wide, opening out upon Madison Avenue. Behind the parlour is the large smoking and lounging hall, at the south end of which is the hat and coat room. In the rear is the billiard-room, with twelve standard-sized billiard and pool tables. At the extreme south, on the Madison Avenue, is the private entrance to the concert hall, which is on the second floor. In the rear of this entrance, and approached only through the Club proper, are the boot-blackening rooms, lavatories, retiring closets, barber's-shop, and bar-room, which has an entrance directly into the billiard-room. On the second floor [fig. 177] is the concert hall, with a seating capacity of 1,500 persons. The length of the hall is 107½ ft. by 62 ft., with a stage 38 ft. 10 in. by 24 ft., dressing-rooms and proscenium boxes on either side, and a balcony on Madison Avenue end. At the back of the stage is an iron stairway to the alley leading to 45th Street. On ascending the main stairs, and on the floor with the concert hall, are the reading-rooms, the writing-room in the rear of that, the governor's room, and the card-room. On the same floor is the ladies' parlour and toilet room, two large parlours, and a pantry for the use of those wishing refreshments during



SECOND FLOOR PLAN.

FIG. 177.—THE MANHATTAN ATHLETIC CLUB.



INTERMEDIATE FLOOR

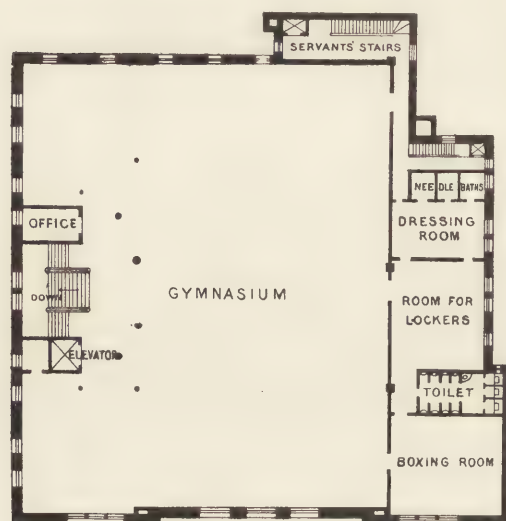
FIG. 178.—THE MANHATTAN ATHLETIC CLUB.

entertainments. This hall is expected to net a large revenue for the Club, and is separated from, or opened into, the Club by two large folding doors opposite the main staircase. The ceiling is 25 ft. high, the rooms on either side having ceilings only  $12\frac{1}{2}$

ft. As we ascend the main staircase we come to what is called an intermediate floor [fig. 178], which contains 18 large sleeping apartments and the gentlemen's smoking-room, at the back of which are dressing-rooms for the use of those occupying the concert hall.

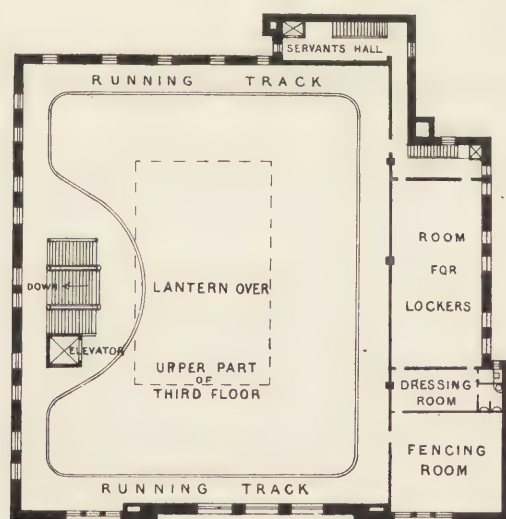
On the third floor is the gymnasium [fig. 179], the dimensions being 109 ft. by 47 ft. 6 in. This floor is fitted up with the most modern apparatus, and is one of the best rooms and most perfect of its kind in the United States. On the south is the boxing-room,  $29\frac{1}{2}$  ft. by  $25\frac{1}{2}$  ft.; there are also toilet-rooms, lounging-rooms, locker-rooms, dressing-rooms, a drying-room, and three needle baths; behind the bath-room is a short stairway ascending to the running track or gallery above. The running track is 10 ft. wide, and 14 laps to the mile in length. It is  $12\frac{1}{2}$  ft. above the gymnasium floor, and 10 ft. clear from track to ceiling [fig. 180]. On the south of the running track is the fencing-room, 29 ft. 7 in. by 25 ft.; lounging and retiring rooms, and a room for lockers, are also provided. Over the gymnasium is a skylight, 50 ft. by 40 ft., which furnishes sufficient light for the gymnasium and for rooms on the floors above, where windows open into it, and its height will enable the climbing ropes and upright ladders to reach a distance of 41 ft. from the floor.

The floor above [fig. 181] the gymnasium contains the dining-hall and private dining-rooms, the housekeeper's apartments, servants' sleeping-rooms, ice-house and stores, laundry manager's and clerks' rooms, kitchen pantry, scullery, and service-room. The dining-hall is 63 ft. by 23 ft., and the



THIRD FLOOR PLAN.

FIG. 179.—THE MANHATTAN ATHLETIC CLUB.



PLAN OF RUNNING GALLERY

FIG. 180.—THE MANHATTAN ATHLETIC CLUB.



private dining-rooms at either end are so arranged that they can be used for small parties, or thrown open and become part of the main hall.

Arriving at the landing on the next floor, we enter an enclosed room which leads to the roof garden, which is surrounded by, and covered with, a roof of iron construction. On the south side is a pantry from which refreshments are served, and in this pantry is a hydraulic dumb-waiter running through the kitchen to the bar-room on the first floor. At the other end of the alley at the south side are the Otis freight-elevator and servants' stairs, which extend to the top of the building, with platforms and openings at each floor.

All the floors are laid with 8-in. terra-cotta tile blocks projecting  $1\frac{1}{2}$  in. below the bottom flanges of floor beams. Partitions are of hollow tiles, with necessary porous tiles for nailing trimmings to other woodwork. All outside walls are lined with hollow bricks laid up with the walls, with a line of headers in every sixth course. The steep roof over the front of the building is covered with patent composition blocks (2 in. thick), laid on the angle irons, and afterwards covered with Spanish tiles.

The roofs are constructed entirely of iron, copper, concrete blocks, and Spanish tiles, the blocks being placed between the flanges of small T-iron bearers or battens, and all joints carefully made in Portland cement. The blocks are composed of breeze and cement, and form a light fireproof covering; each block measures 20 in. by 15 in. by 2 in. Upon this is laid a covering of thin felt or roof paper, which is secured to the blocks with galvanised iron nails and collars of tin. The paper is used not so much for protection against weather, as for the use of workmen who require a good even surface for lining out when laying the roof tiles; the tiles are fixed each with two galvanised nails, and bedded and pointed with cement putty, making a very clear and smooth roof. The tiles are corrugated, and measure 12 in. by  $8\frac{1}{2}$  in. The hip tiles are semicircular, of 7 in. diameter, each fixed to a wood roll with one nail and cement joints.

The skylight is constructed with T-iron wrought trusses sufficiently strong to support the heavy glass skylight laid upon it, and two of the trusses are sufficiently strong to carry the trapezium which may hereafter be suspended therefrom. The skylight proper is made of copper ribs and  $\frac{1}{4}$ -in. thick ribbed glass in large squares, and is provided with movable sashes, likewise of copper, in the upright sides. The roof ventilator on top of skylight is entirely of copper, and is well secured against weather. The well-



FIG. 181.—THE MANHATTAN ATHLETIC CLUB.

hole of this skylight has been formed under difficulties. The clear space on floor of gymnasium being of much importance, no uprights could be used. The sides of well are therefore made of two immensely deep girders of lattice type the full depth of one storey; the spaces between the lattice are filled in with fireproof blocks, serving the purposes of both girder and partitions.

The roof over the garden is proportioned for 50 lbs. per square foot, in addition to the weight of the structure. The general details of the framing are:—A heavy truss is placed parallel with Madison Avenue, supported by side walks and one row of columns; from this truss, and at right angles to it, are placed three trusses, which receive support from it and from a rear row of columns; two of these form the sides of a light shaft, and are constructed to receive fireproof filling. The bottom chord consists of two 10-in. channels, 7-in. vertical beams, and diagonals of two 7-in. channels. The front slope of roof is supported by jack rafters, spaced not above 6 ft. apart, covered by  $4\frac{1}{2}$  by 2 in. T-iron purlins,  $20\frac{1}{2}$  in. between centres. The rear and side slopes are constructed in a like manner. The wrought-iron principals are composed of two angle irons 3 in. by 2 in. bolted together; the hip rafters are of double angle iron, same as trusses, but with an extra plate 3 in. deep, bolted between to receive other short rafters and as extra stiffening. The roof garden is so arranged with plants and trees that it can be used either as a promenade or a conservatory; or the whole surface can be flooded with water; and in freezing weather the natural ice can be used for skating—affording at the same time opportunities for other outdoor winter pastimes. The view of landscape from any side of the garden is grand and impressive.

The main staircase to the roof is constructed with wrought-iron strings covered with cast-iron casing; the outer strings are 12-in. channel iron, the centre carriage being a 12-in. iron joist, to which cast brackets are bolted to receive the steps. The fascia round the well-hole and on strings is ornamented with panel-work and relief ornaments; the newels and railing of cast-iron are highly enriched. Steps and platforms are constructed of slate. Other stairs are similar in construction, and in a more or less degree ornamental as the case requires. Those of the best floors have Italian mosaic inlays in treads at the value of \$ 3.00 per square foot. The risers and nosings in the two entrance vestibules are of bronze metal.

#### THE CANCER HOSPITAL, NEW YORK.

The building bearing the above title occupies a site at the corner of 8th Avenue and 106th Street, adjacent to and overlooking the Central Park. It is designed in the style of what is known as French Gothic, and is built in Belleville stone and red-pressed bricks, the roofs being covered with dark-coloured slates. The walls of the corridors and hall on the ground floor are faced with yellow brick, finished with a neat stuck joint, the dado to a height of 3 ft. 6 in. being of dark red brick; the upper parts of walls are also relieved with red brick courses at intervals, and black joints. The remaining walls throughout the building, except the basement storey, are executed



in plaster with a plain hard finished surface. The floors of the hall and other parts of the ground storey are lined with marble mosaic designed in a simple but effective diaper pattern in two colours, the squares being marked by double lines of salmon-coloured pieces, and the filling of a light yellow-ochre tint. The result is as pleasing as it is simple, and produces the brightness and appearance of cleanliness so desirable in institutions of its class. The stairways are constructed of iron and slate; the risers, carriages, and strings all being of iron, and the whole of the iron-work exposed to view is finished in copper bronze paint, while the handrail is polished oak.

The plan is arranged upon the circular ward method [Illustn. x]. The basement rises partly above the surface of ground, and is used chiefly for heating and ventilation purposes; the ground floor is arranged for administration and rooms for private patients; the first and second floors are devoted to wards, rooms for private patients, and dining-room; the third floor is for an operating-room, the kitchen service, and bed-rooms for the staff and nurses.

This is the first hospital with circular wards erected in the United States, and is considered in many respects superior to the usual parallelogram form. The experience gained thus far, shows that, for wards of 40 ft. diameter, built in towers accommodating eleven patients in each ward, the circular form presents unquestionable advantages: ample light is secured by the disposition of windows at the sides of the wards; the absence of angles and corners promotes cleanliness; the patients are under the immediate eye of the nurses to a degree impossible with the parallelogram form; the radiating arrangement of beds permits greater space between the heads of the beds; the ready access to the patients saves much labour on the part of the nurses; and the very cheerful aspect of wards of this form of construction is not without value in depressing cases of illness [fig. 182].

The building is heated by steam; fresh air supplied from a court above the street level is forced by a fan into the cellar, and passing between the steam coils is warmed before rising through air-ducts in the walls into all rooms. Foul air is extracted by power<sup>1</sup> located in the attic, and discharged at top of the roof. A point of vital importance in a building designed for the treatment of a class of diseases in which purity of air is essential, is a most perfect system of ventilation, and it is in this building that such an example is to be seen. The air of each ward can be changed, with closed doors and windows, every five minutes, without production of annoying or dangerous draughts. In one of the wards which has been devoted to the treatment of the most offensive cases, almost absolute freedom from unpleasant odours has been secured by the aid of thorough disinfection and by rapid change of air.

The heating and ventilating arrangements in this structure are exceedingly good. The boiler room has been fitted with two boilers, space being left for a third if found necessary on extensions being made at any subsequent period. These boilers are of steel,  $4\frac{1}{2}$  ft. diameter, 17 ft. long, with 30-in. drums, and 52 three-inch tubes in each. Their shells are each 18 ft. long, the additional foot forming a 12-in. smoke-box, one end of which is connected with an iron pipe 3 ft. diameter crossing the boiler

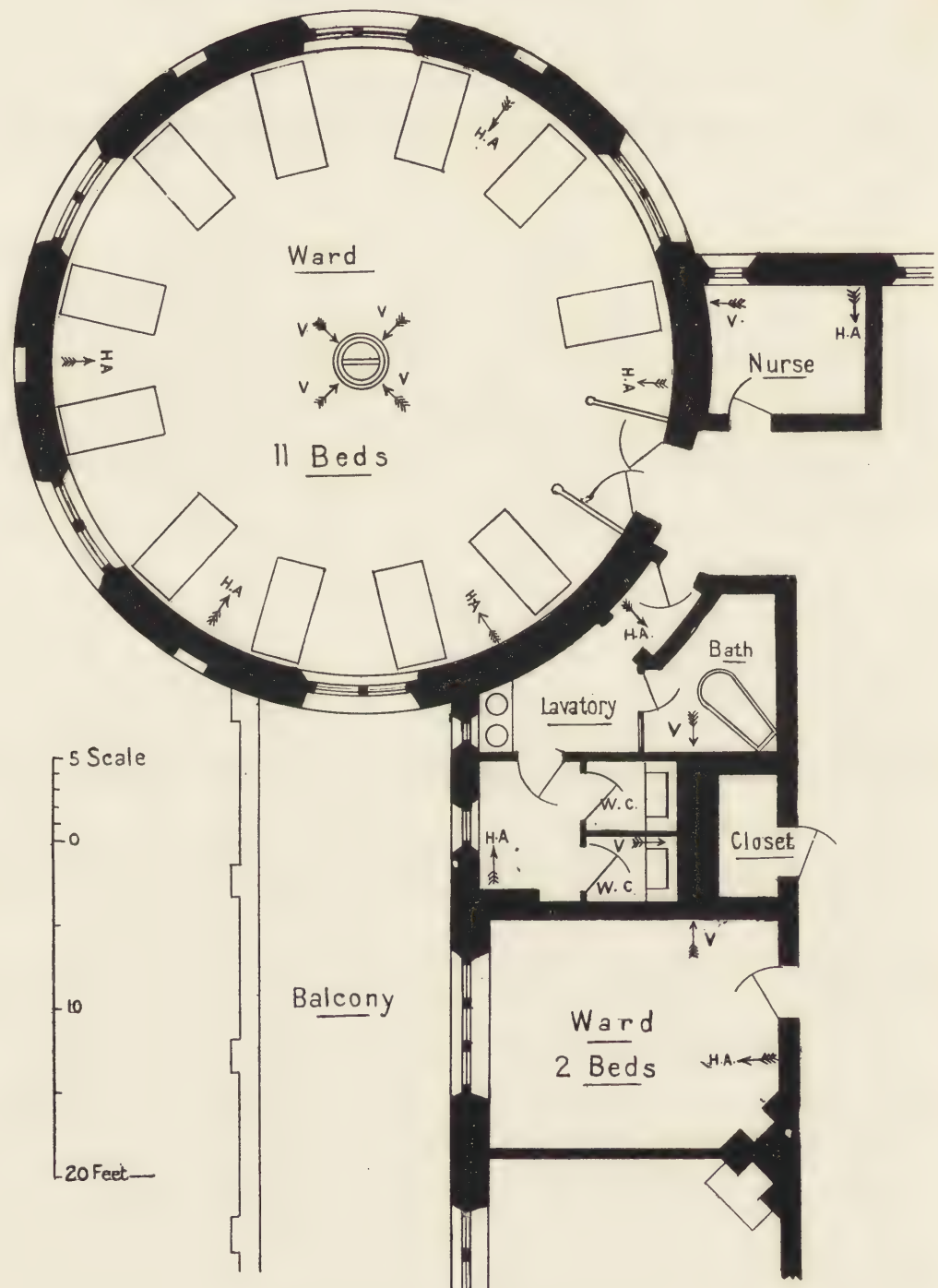


FIG. 182.—THE CANCER HOSPITAL, NEW YORK.

(See Plans Illustrn. x.)

Reproduction of one of the pencil illustrations in Mr. Cox's MS. Report.



room, and descending to the floor, where it enters an underground flue which leads to the base of a brick stack, circular in form and 90 ft. high. Each boiler has 25 ft. superficial of grating surface, and the average pressure of steam is 60 lbs. The steam at this pressure is supplied to the pumps and machinery in the laundry, as well as to the radiators throughout the building. High-pressure steam is also supplied to the blower engine and to the pump of the hydraulic elevator. The heating in the residence is reduced in pressure by a regulating valve. In moderately fair weather, the exhaust steam from the blower engine and the pump is sufficient alone to warm the building.

The ventilation scheme adopted is that of "indirect" radiation, the heating coils being placed in the basement, and suspended from the ceiling immediately under the base of each hot-air duct, connecting the floors over—by which arrangement the engineer is enabled to regulate the quantity of warm air required in each compartment. The boilers are supplied from pumps through a 2-in. pipe, which drops down as it approaches the front of the boilers and separates into two 1½-in. branches, with stop and check valves fitted to each branch. The steam is directed from the front of the drums by 6-in. pipes leading to a cross connection of the same diameter. The main pipe, after allowing a 3-in. branch to supply the pumps of laundry fittings, is continued across the boiler-room and drops down to an underground duct leading to the main building. The blow-off cocks at the back of the boilers are connected to a 1½-in. pipe, which is carried to the pump-room and enters the blow-off tank. The return water from the main building is taken back through the duct by a 3-in. pipe, which empties into the return-water tank. All deficiency in the return water is compensated by a ¾-in. "Croton" supply pipe. The return-water tank is cylindrical, 30 in. in diameter and 4 ft. long, composed of heavy boiler plate with cast heads. At one end is fitted a man-hole and on the other a water-gauge. The tank is, however, not under pressure, and a 1½-in. vapour-pipe is carried up through the roof.

The drainage is executed on the "Durham System," which may be broadly described as a combination of scientific design, proper material, and correct mechanical construction. The design of work, the materials used, and the workmanship employed are an entire departure from the methods used in ordinary plumbing work. The result so gained is a system of pipes which are independent of the building for support, which cannot be cracked or broken, and whose joints are permanently gas-tight. The apparatus, constructed of wrought-iron steam pipe and heavy cast-iron fittings of special shapes, screwed together, is elastic under pressure, and at all points invulnerable. The screw-threads on the pipes and in the fittings are cut by machinery to a standard gauge, so that they exactly correspond. The threads are slightly tapering, and the further the pipe enters a fitting the tighter becomes the joint between the two. Threads are covered with a thick paste of red lead and oil, and the pipe is then screwed by means of steam-fitters' chain tongs, by which a powerful leverage can be exerted. The joints are, therefore, very simple, easily made, and require no skill: a labourer can make a tighter screw-joint in one minute than a plumber with his materials could make in an hour. Another advantage of this system is, examination of

drains and soil pipes can be made at any time without the expense of tearing up. There is no objection to their being in sight everywhere; no joints are made between the thickness of floors. The pipes are painted or bronzed, according to position, and look simply like ordinary steam pipes. In this hospital a 3,000-ft. run of these pipes is in view. Hand-holes, closed by screw-plugs, are provided at every change of direction; and, with the aid of a wrench, the resident engineer in charge of the building can examine the interior condition of the drains or remove any obstruction.

The fittings are all cut to the grade required by each run of drain pipe, the minimum being  $\frac{1}{4}$  in. per foot. Where short lead waste-pipes from baths, bowls, sinks, &c., connect with the iron piping, brass screw nipples are provided to which the lead work can be soldered. The ventilating pipes are carried up through the roof, and connection with the roof is formed by an iron screw-down cap over the edges of the lead flashing, which is made into a circular apron form and dropped over the pipe, the lower flange or base of which is covered with slates. A coupling is screwed on over the roof connection, into which an extra piece of pipe is screwed and carried to the desired height above the line of roof.

The floors of the bath-room, lavatories, &c., are formed of large slabs of slate resting on moulded iron beams. The closet fittings, &c., are provided with a wrought-iron screw-flange floor-plate for connecting with soil pipe, which passes through the slate floor, and is suspended from the iron beams with wrought-iron hangers.

#### THE RESIDENCE OF MR. W. K. VANDERBILT, NEW YORK.

This handsome structure [Illustn. ix] occupies the north-west corner of 5th Avenue and 52nd Street, having a frontage on the Avenue of 100 ft., and 125 ft. on 52nd Street. It is built of limestone, and treated in the early Renaissance style, Gothic and Classic forms being freely used together. The main feature in the Avenue front is the entrance doorway and gable composition, over-flanked on the upper storeys by a *tourelle* or *flèche*, which is executed in delicate tracery enriched with small pilasters and carving. The entrance doorway is an elliptically shaped arched opening, with pilasters at the sides supporting a cornice, above which is a balcony with niches in the two sides, the central portion being filled in with an enriched closed balustrade. The whole of this part of the elevation to 5th Avenue is richly carved, and the dormer window, the crowning feature, is flanked by perforated stone flying-buttresses. The richness of the centre piece is much enhanced by the breadth of plain wall-surfaces on either side, being relieved only with small string-courses at the window-sill levels, the joints of the windows being carved, the mullions left plain. The roof is covered with blue slates, and is finished at the ridge with a tall copper cresting, and well-proportioned copper finials. The chimneys are all different in design. The front entrance doors are of oak with heavy bronze hinges; the doors, however, are made to slide in the thickness of the walling.

The vestibule, entrance hall, and principal stairway are finished in Caen stone,



the wainscoting being 7 ft. high and carved. The ceiling is in quartered oak with carved panels. The stairs to the upper floor are on one side of the main hall. The parlour is in the style of François I., with a walnut-wood ceiling. The salon is after the style of Louis XVI., in ivory and gold. The dining-hall, which occupies two storeys in height, is in the style of Henri II. The wainscoting is wood, 7 ft. high, above which is a wide border of tapestry, hanging from the carved stone wall which appears above it.

There is some excellent stained glass in the window screen to the dining-room, opposite the principal entrance, representing events in English history during the reign of Henry VIII. The dining-room has a double fireplace.

The library is executed in ebony, with bookcases to correspond. The corner chamber on the second floor is furnished in light walnut, in style of Henri II. The nursery is finished in mahogany, with a fireplace of terra-cotta.

Many other interesting details are to be seen in this residence, but as they are more of an artistic than a constructive nature, they hardly come within the range of subjects named in the conditions of this Studentship. I have, therefore, merely mentioned the general points of the building as a comparison with the Marquand residence, which comes in the same class, but is of a more recent date.

#### THE RESIDENCE OF MR. MARQUAND, NEW YORK.

This house [Illustn. ix], located on the corner of 68th Street and 5th Avenue, is the largest of a group of three houses, which are so designed that, while being distinct, they make a picturesque group. It is one of the most costly residences in New York, and compares favourably with, and perhaps, in some of its details and interior finishings, exceeds the excellence of the Vanderbilt house. The plan is of an oblong shape, consisting of a large central hall, with balustraded gallery in tiers, lighted from the roof, the rooms being placed on all sides of the hall, communicating with it on the ground floor, and with the galleries on the upper floors. Each room is treated in a distinct manner, and all are carried out in excellent taste and workmanship. The staircase is of solid oak, with well-designed newels and balusters, the balconies to galleries being all of the same material and corresponding detail. The ceiling of the drawing-room is the work of Sir F. Leighton, P.R.A., and the piano-case, chairs, &c., are from the designs of Mr. Alma Tadema, R.A., the materials used being ebony and ivory, with inlays of various other hard woods in delicate scrollwork and heraldic devices. The conservatory opens out of the drawing-room; it is supplied with fountains and is paved with coloured marble, the side walls being of a light-coloured Siena marble, with portions of facings in panels of Mexican onyx.

The dining-room is treated with oak panelling, some of the panels being filled in with old tiles of Spanish and other designs, the fireplace being entirely formed of these beautiful coloured tiles fixed with bronze angle irons, &c. The backs and sides of the fireplace are of cast bronze, with figures in bas-relief. Most of the walls are covered with rich, embossed leather as a filling, and the hall and corridors are entirely of

tapestry of exquisite design. There is also some excellent stained glass about the building, and pictures, the works of both ancient and modern artists.

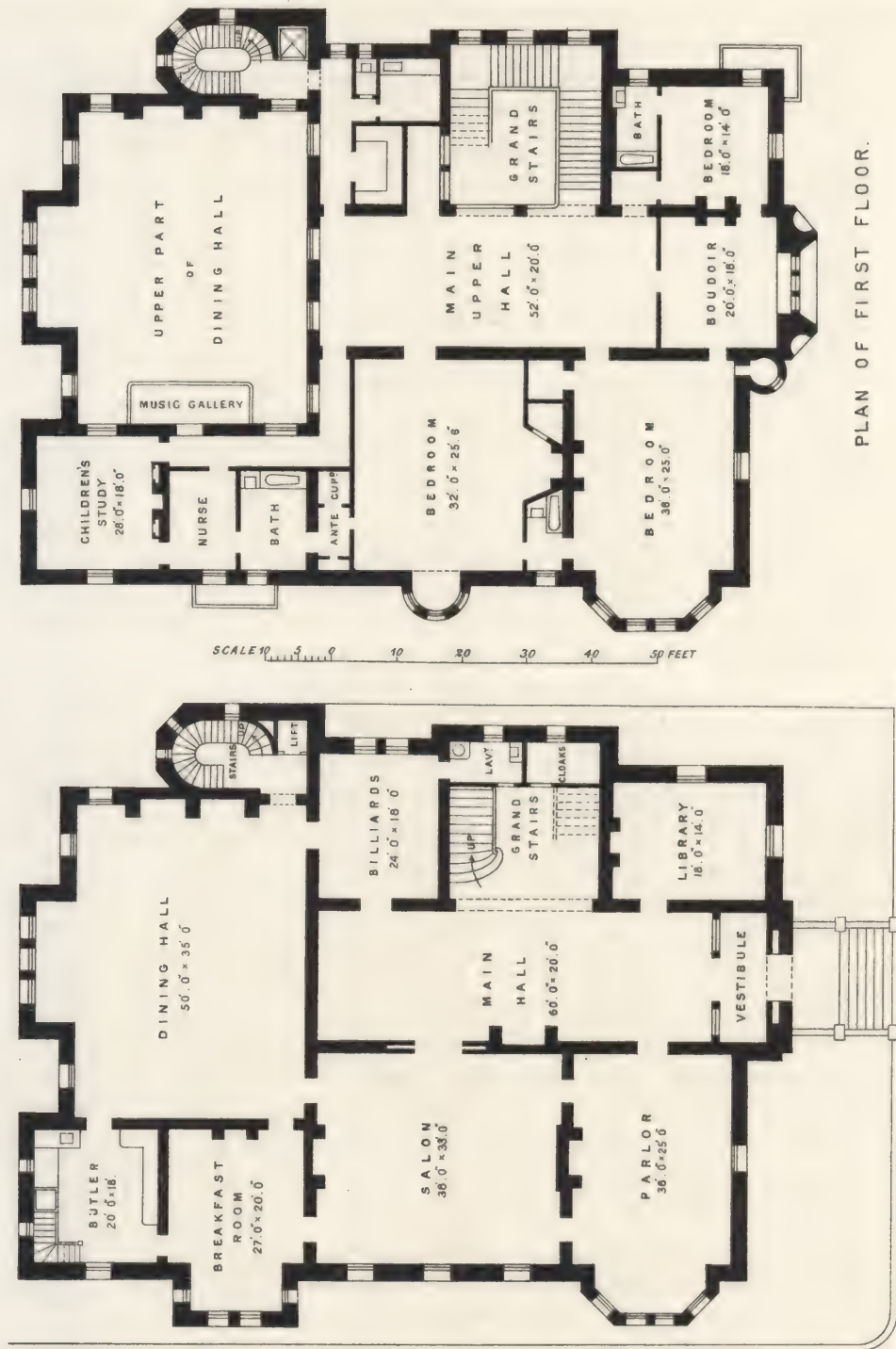
The corner and most of the 5th Avenue front are occupied by the conservatory, which has an iron roof glazed with stained glass, the leaded lines of which are gilded on the inside. Above the conservatory the roof is cut away, and the space is partly filled on the second floor by a small extension, the balustrade connecting with a corner balcony. The main façade is broken up with two slightly projecting towers of different size, breaking through the lines of the main cornice. The building is three storeys in height besides the rooms actually in the roof-space, which are lighted by dormers. The materials used in the exterior are red brick and brown stone. The basement is rusticated, the rest of the stonework being ashlar-faced. The architecture is transitional, of the period between late Gothic and early Renaissance. The roofs are covered with blue slates and crested with copper. The saloon is finished in the Pompeian style of decoration; the den in Mauresque; the main hall and principal rooms in French Renaissance. The dining-room is treated entirely in the Japanese style.

To give a detailed account of the building and its furniture would be the work of a longer period of time than was at my disposal; it was my privilege to see over the rooms in the short space of about three hours, under the guidance of Mr. Marquand, who explained the salient points of interest in a brief and clear manner. The plumbing, however, being an important factor, called for more attention than other parts of the building. I herewith append some details of it.

The water, supplied from the "Croton" main at the 68th Street side of the building, is connected by two pipes: one for direct service, and the other to supply a hot-air engine, which forces the water to the tank at the top of the house for a high or indirect service. These pipes are of drawn tinned brass, 2 in. diameter. The house having but one regulation tap, it was necessary to carry these pipes to a point as near the main as possible before uniting them, to prevent the action of the pump when in operation from causing stoppage or intermittent flow of the direct service. To obviate this a drum is used, which is 4 in. in diameter and about 5 ft. long, connected to the main by a service cock. This method induces friction and allows the disturbed water-current to assume direction, giving a result equal to separate taps. On the Madison Avenue side of the house is a separate service pipe, 2 in. diameter, carried from the street and connected with the general supply of the house, to ensure a supply to the basement in the event of the main on 68th Street being shut off. All the cold water distributing pipes, either from street or tank, are brought to the cellar ceiling, from which they are suspended, and thence run to their respective rising mains. All the warm water-pipes are carried to the ceiling in the same way, and connected with the several risers. The "Croton" supply pressure is insufficient to reach the third storey, so all water at that level is from the tank pipes. The second-storey water is supplied from either of the two systems, with the means, at every line, of changing entirely from one system to the other. All water taken to the first floor and basement is from both the street pressures.





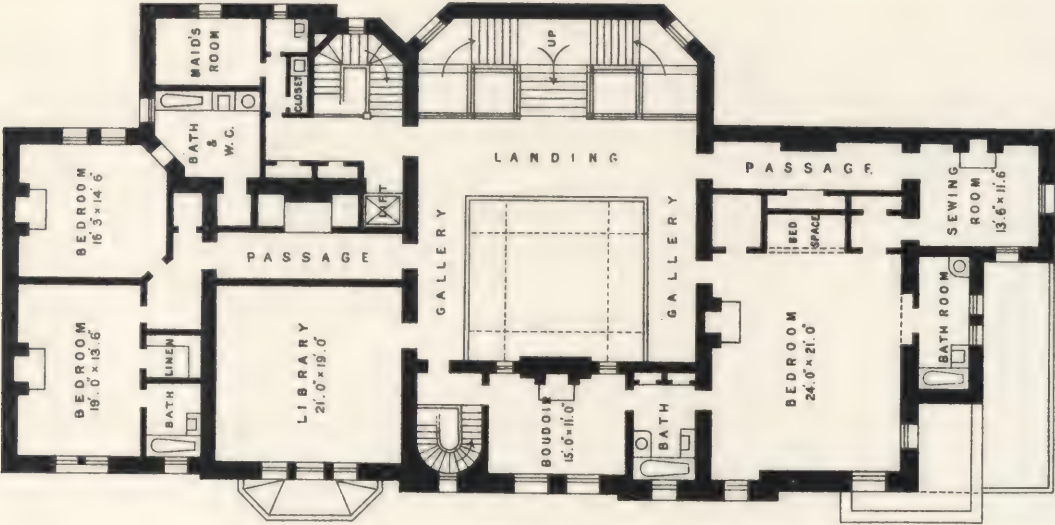


PLAN OF GROUND FLOOR.

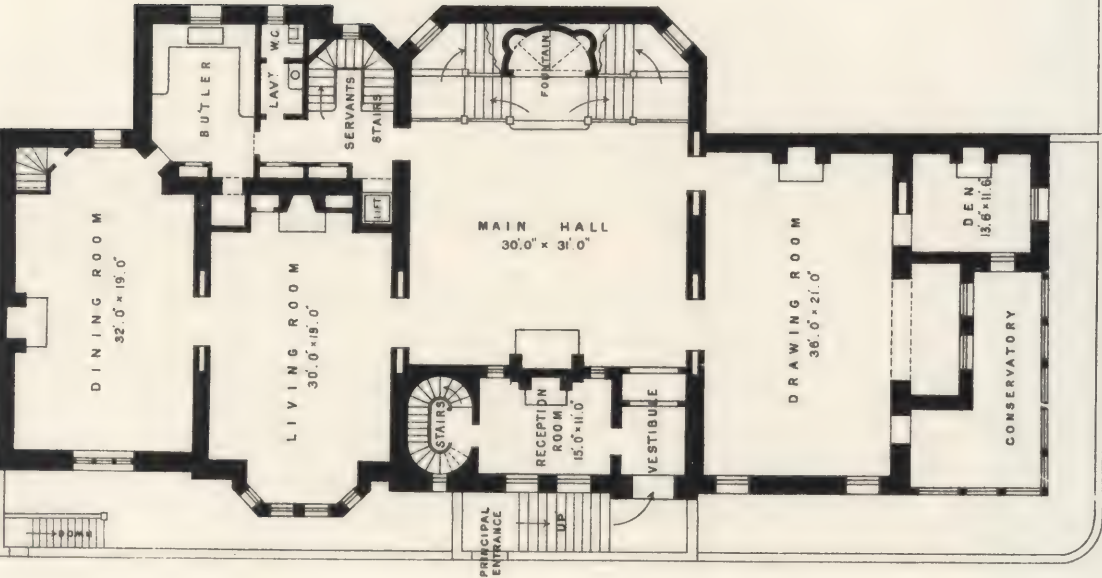
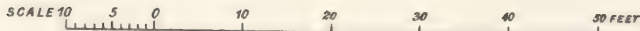
MR. W. K. VANDERBILT'S HOUSE, NEW YORK.

[Page 362.]





1ST FLOOR PLAN.



GROUND PLAN.

MR. MARQUANDS HOUSE, NEW YORK.  
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The Croton water pipe,  $1\frac{1}{2}$  in. diameter, is taken from the general cold system in the cellar; passing through the floor of the kitchen, it enters the boiler at the top. Between these two boilers is fixed a  $\frac{3}{4}$ -in. pipe, connecting the two risers, each furnished with a stop-valve and check-valve: the object of this pipe being to allow the water to pass from the Croton pipe into the tank pipe, and thence into the tank boiler, should the water supply from the tank be at any time disturbed, or should the tank run dry. The passage of the water from the tank pipe to the Croton pipe is prevented by the check-valve, which opens upward and is kept in its proper place when water is in the tank by the great pressure. There are separate water-backs and draw-off connections to each boiler. All the pipes (except the waste and air pipes) are seamless brass pipes tinned, and the fittings are mostly of brass, the couplings being extra heavy with long threads, and all nickel-plated. Every branch of the main leaders in the house is fitted with a stop or gate valve near the kitchen ceiling, and to secure a stop and waste a T-piece is fitted on the fixture side of the stop. The sinks used are of white porcelain, supported on cast brass frames with turned legs. The slabs at the backs of the sinks are of reddish-grey marble (known as Tennessee), to which the pipes are secured.

The kitchen range has a large, brass-framed hood fixed over it, and underneath is a large register opening into a flue parallel with the range smoke-flue, which latter warms it. The flue is 16 in. by 12 in. The hood is lined, inside and out, with light-tinted tiles made to match the walls of the kitchen, which are also faced with encaustic tiles, the tints being neutral. The laundry is a room 21 ft. by 21 ft., with a tile floor, and the walls are of white glazed tiles with encaustic border round ceiling line. The wash trays are of white porcelain, six in number in two groups, four and two respectively. The water for laundry purposes is heated from the kitchen range, which is furnished with two U-shaped water-backs surrounding the fire-chamber on three sides. Each boiler has a separate grate and fire. There is also a special water-back provided for the hot-water circulating apparatus, to which are attached the pipes in connection with the drying-room. On the top of the kitchen range of the left side, and occupying nearly half the surface of the range plate, is a copper boiler, of 25 gallons capacity, for boiling clothes or warming extra quantities of water, as may be required; and it is fitted with a draw-cock at the end.

The detail of standard for supporting the waste pipes is of heavy lead: it is placed in a segment of 3-in. brass pipe, with two small segments, but of larger width, and all are riveted together to form a bed for the lead waste. The upright portion is 1-in. diameter brass pipe, and the shoulder-piece and base are brass castings screwed together at the base; but the shoulder-piece is merely dropped over the vertical pipe without thread or screw, being simply fitted into it. This is done to get equal adjustment as to length, so that all pedestals have equal bearings on the floor, and any necessary adjustment is obtained by revolving the pipe with screwing tongs, in or out, as the case requires.

In the drying-room are eight drying-frames or horses, 8 ft. long, 8 ft. high, each

provided with eight wooden bars for hanging clothes, instead of on wire. The bars are in pairs, and the top edges rounded. They are composed of 6 in. by 2 in. white wood, and are mortised into the back boards and fastened with railbolts, the nuts being embedded in the bars. No bracing is necessary, the bars being of sufficient strength to resist warping or swaying. The track and frame on which these slides run are 4 in. by 4 in. ash, suspended from the ceiling by bolts screwed to the joints. The jambs and panels are ash, and the handles of bronze metal. No iron is used in the framing, and rubber bands are sprung on the wheels to prevent noise. The ventilation is arranged in the upper part of the drying chamber through a brick flue  $1\frac{1}{2}$  ft. square, which extends to the roof; the fresh air enters at the floor level under the heating coil,

The plunge bath is on the third storey. It is made of Tennessee marble slabs,  $2\frac{1}{2}$  in. thick, rebated together at the angles. The sides are housed into the bottom, the whole bound together with brass rods and bars. At one end of the bath are three steps for convenience of egress. The floor of the room, and wainscoting to a height of 4 ft. 6 in., are also of Tennessee marble of various shades of colour, well selected, and executed in pleasing combinations. A large slab at head of the plunge bath forms a boxing for the valves and pipes and a concealed overflow. It can be taken off by removal of four screws, and give access for inspection. The waste connection from the bath is provided with a cleaning screw at its first bend.

The second-floor baths are of soapstone, rebated together and screwed, after which it is lined inside and cased outside with encaustic tiling, similar to the floor and wainscoting—the predominating colour being pale blue, and the traps and pipes similar to those of the plunge bath. To the right, as you enter through the doorway to one of the second-floor bath-rooms, are the sitz bath, the foot bath, and the wash-bowl. The sitz bath and wash-basin are placed side by side, and the handles which work the sitz are placed on the end of the basin slab. The water is admitted near the bottom of the bath through one supply, the hot and cold water pipes being brought together directly after passing their respective cocks. The wash-valve and pull-rod are placed in a vertical pipe below the valve, from which the wash runs to a bottle trap below the floor, the cleaning screw coming through the marble safe on floor. The back vent pipe from the bottle trap also comes through the safe and enters the wall above the bottom of basin. Under the basin is a strap, the back air pipe of which joins the air pipe from the bottle trap. The foot bath is square in form and is partially portable. Being fixed to the door of enclosure to basin pipes, it can be closed when not in use, no appearance of the foot bath remaining. The heavy bath tub at opposite end of this bath-room is of white porcelain, and is supported on adjustable brass legs, which rest on a marble safe. The pull of the waste valve in this case is at the corner of the tub, instead of occupying the usual position between the two faucets. The floor of this bath-room is of Tennessee marble of rather dark tints. The base, or plinth, is of the same marble of lighter colour, and the wainscoting is of coloured glazed tiles, the chief colour being canary. The ceiling and walls are oil-painted, and enriched with decorative design in delicate finish.



The servants' wash room is on the basement floor. This room is provided with an enamelled bath tub, a porcelain water-closet, and wash-basin. Under the water-closet is a marble safe with waste, the mosaic floor having a slight inclination to the safe. The closet fixtures are all exposed, and are simple in construction. A portable seat of rosewood, with cast-brass legs resting on the corners of the safe, makes the apparatus complete.

The mosaic floor is laid in hydraulic cements, and the sides of the rooms are tiled to half of their height with white glazed tiles. All water-pipes exposed are seamless brass-tinned, with nickel-plated fittings and cocks; the wastes and other pipes are heavy lead. All the safe wastes from the chief divisions of the house are brought together to discharge over a sink in the cellar, and are furnished with swing check-valves, to prevent a current of air from the cellar passing up and into the respective rooms. The sink is of galvanised iron, fixed to the walls on two sides and about 3 ft. above floor, and provided with proper trap and ventilating pipe.

The water-tank is supplied by a 2-in. diameter pipe; it is connected with the caloric engine and with a steam-pump in the cellar. The main supply-pipe from the tank is also of 2 in. diameter, connected with the tank at the side and also carried above the tank for ventilation; there is also a tell-tale pipe  $\frac{3}{4}$  in. diameter. The tank is composed of  $\frac{1}{4}$ -in. wrought-iron, chipped and caulked, is 6 ft. high, and 6 ft. diameter, with a band at the top edge, and a flanged bottom. The tank safe is of  $\frac{1}{4}$ -in. iron, 6 in. larger in diameter than the tank, and 3 in. deep in the clear, the edges or side being formed of a flange turned on the bottom; it is all in one piece, the whole being painted white.

The house drainage is divided; part goes to the sewer in 68th Street, and part to Madison Avenue. The system used is that approved by the Health Department. The house-sewer has a house-trap (or syphon) at area wall, and a foot vent taken from near the kerbstone. There are separate traps for every fixture, and a separate vent for every trap, with back air lines from traps extending above the roof, and the rainwater leaders are trapped where they enter the house system. Separate drains are used for the rain leaders; and the area cesspools discharge into a sealed trap on Madison Avenue side. All the soil drains and back air-vents with their fittings are of extra heavy cast-iron, and were subjected to a very close inspection before being dipped in tar. They were also tested when in place by filling the entire lines with cold water, the horizontal pipes in cellar receiving a pressure of 20 lbs. to the square inch; and this pressure decreases in ratio of 1 lb. per square inch to about every 27 in. of height in the risers. It, however, insures a greater pressure at the highest fixture than it is possible to obtain in ordinary operation. No pipe is underground or hidden, but all are carried on ledges or brick piers, with stone capping and iron cradles.

The main drain, as seen in the boiler-room in the cellar, is fixed above ground to the front wall of the room, which wall extends to the line of kerbstone. The sewer, on passing through the wall at this point, is furnished with a screw plug to give a straight opening into the sewer for examination. The house-trap, on the sewer side of the trap, has also a

hand-hole for inspection ; and the ventilating pipe, which rises from a T-piece, passes upwards vertically till reaching the kerbstone. The boiler-room is 4 ft. deeper than the cellar floor of the building, and is sufficiently below the subsoil drainage to permit of the arrangement above described. In consequence of the boiler floor being below the sewer level, a hand-pump is provided, and connected with a receiving basin under the paving, into which it can run and be pumped into the sewer.

The arrangement of pipes under the ice-box in the butler's pantry consists of a pine box, 12 in. long by 7 in. deep in the clear, of  $1\frac{1}{2}$ -in. boards framed together, lined with 6 lb. lead, and provided with a stand-pipe which is fitted into a ground ferrule, which together with the waste-pipe connecting with the trap are wiped-jointed to the bottom of the box. The drip pipe from the ice-box is carried about 2 in. below the surface of the water in the box. This cases a trap to the pipe, and prevents a current of air from the cellar passing into the ice-box, and also cuts off direct communication with the house drain. To cleanse the box the stand-pipe can be removed, allowing all sediment to be washed from the box into the main drain. A water-pipe placed over, and to discharge into, the box allows ample means for flushing when found necessary.

The elevator employed is one of the "Whittier" passenger elevators, worked by hydraulic pressure. The vertical cylinder is 24 in. diameter ; the lower tank is 4 ft. wide by 12 ft. long by 6 ft. deep, from which a steam pump, with eight steam cylinders and 5-in. water cylinders by 14-in. stroke, forces the water again to the elevator tank on the top of the house.

#### THE PRATT INSTITUTE, BROOKLYN.

The Pratt Institute was established with the object of promoting manual and industrial education, and of developing habits of industry and thrift. The Institute is based upon an appreciation of the dignity, as well as the value, of intelligent handicraft and skilled labour. It endeavours to give opportunities for complete education ; to establish a system of instruction whereby habits of thrift may be inculcated ; to develop those qualities which produce a spirit of self-reliance ; and to teach that personal character is of greater consequence than material productions. Its class-rooms, workshops, library, reading-room, and museum are designed with the best accommodation for this purpose. The buildings are situated on Ryerson Street, and extend through to Grand Avenue, the principal entrance being on the former street. The main block is 100 ft. by 86 ft., and six storeys in height. The Mechanical Arts building, together with the extension to the main building, measure 144 ft. by 95 ft., the former being four and the latter five storeys high. The Trade School building is one storey high, and 103 ft. by 95 ft. The construction is of brick, with dressings of stone and terracotta. The heating is by steam, and the lighting by electricity.

The Institute is under the control of a board of trustees. The work is divided into departments, the heads of the various departments constituting the faculty, each member of which is directly responsible for the work of his department. In most of the departments, morning, afternoon, and evening classes are held ; and in all these



the nature of work is similar, though in the evening classes the courses are of necessity abridged. Both boys and girls are admitted to the classes, and receive equal privileges.

The school affords opportunity for a three years' course for both sexes in education, such as is given in an ordinary high school, and combines with this, systematic courses in drawing and various forms of manual work. A school in which manual work is a feature has advantages over others, not the least of which is that it gives students an early opportunity of discovering any aptitude they may possess for a particular vocation.

The manual work for boys is under the department of Mechanical Arts, and is arranged in graded systematic courses as follows :—

*First year.*—Fall term : bench work ; use of tools ; joinery and construction.

Winter term : wood-turning ; straight and moulded ; centre trimming ; chucking ; inside turning ; spinning bowls and cups.

Spring term : pattern making ; principles of moulding ; draft halving ; cone boxes and building up.

*Second year.*—Fall term : moulding ; two-part moulding ; cone making ; swept up work ; ornamental pieces in bronze.

Winter term : forging ; management of fire ; drawing ; upsetting ; forming.

Spring term : forging ; welding ; making steel tools ; tin-smithing ; soldering ; sheet-tin work, and brazing.

*Third year.*—Fall term ; bench work ; chipping ; fitting use of taps and dies.

Winter term : machine tool work ; theory of cutting tools ; turning ; boring ; screw cutting.

Spring term : general tool work ; construction.

The shops and laboratories of this department occupy the entire first floor of the Mechanical Arts block ; two rooms in the basement, two on the second, and two on the third floor. The method of instruction adopted is : the teacher first executes the lesson before the whole class, the proper method and the principles involved are carefully explained, and the applications of the exercise in practical work are pointed out. Each pupil then takes up the work, and the instructor gives individually what further advice or correction may be necessary.

*Bench work.*—The wood-working bench-room is provided with forty-eight single benches, each supplied with a complete outfit of hand-tools, vice, tool cupboard, and drawers. The pupil is first taught the use of the saws, planes, and chisels, and the proper methods of laying out work. And lastly, a few constructive pieces are executed, *e.g.* a small panelled door, a sash window, dove-tailed box, &c.

*Turning.*—The lathe-room is supplied with forty-eight nine-inch speed lathes ; each lathe has its complement of turning tools and drawers for the work. The room also contains a hand-saw, two jig saws, and the mill tools for preparing stock ; a double circular saw, feed planer, and jointer. It also contains twenty-four sets of bench tools for pattern-making. The work in turning embraces straight, shoulder, moulded centre turning, in soft and hard woods.

*Spinning.*—The elements of metal spinning are next taken, and type forms of bowls, cups, vases, &c., are worked out in thin sheet metal.

*Pattern-making.*—The operations of moulding are first explained to make clear the

function of draft halving, cones, &c., and then patterns are prepared for some of the pieces to be used later in the machine shops, after which more difficult pieces, such as pipe elbow, grooved pulley, and straight-faced pulley, are executed.

*Moulding.*—The foundry is fitted with twenty moulding benches for ironwork, and twenty for brasswork, each being supplied with its set of moulding tools and flask. A 20-in. cupola, two brass furnaces, a gas furnace, and a cone oven, complete the equipment. In this shop the patterns prepared in the previous year are first used, and by their use the operations of two-part moulding, cone-making, and three-part moulding are taught. When students become more advanced some ornamental pieces are moulded and cast in bronze, and the process of making mouldboards from them explained. Casting in plaster from clay models is also taken at this stage.

*Forging.*—The forge shop is fitted with twenty-four steam-power forges and one hand forge. The blast is supplied by a centrifugal blower, and the smoke and fumes are carried off by an exhaust fan. Each forge is furnished with anvil, tongs, hammers, and other tools. The care and management of the fire are first explained, and afterwards working in steel is practised, and sets of chisels and lathe tools are made and tempered. To gain an idea of the exact treatment of the piece before dealing with the hot iron, many of the examples are first executed in lead by each pupil.

*Tin-smithing.*—A portion of the machine shop is devoted to tin-working, and is furnished with furnaces, anvils, shears, and soldering irons for the use of twenty-four pupils. The course comprises the preparation of different metals for hard and soft soldering, practice in soft soldering, brazing, and laying out of simple pans, pipes, cups, elbow-joints, &c.

*Machine Shop.*—Benches are provided for twenty pupils, with vice and a supply of files, chisels, and other tools. The power tools consist of eleven 14-in. engine lathes, six speed lathes, two 24-in. and one 16-in. planer, two upright drills, one universal milling machine, one grinding machine, one hand lathe, one grindstone, and one wet emery wheel. The bench work consists of chipping, surface filing, straight, parallel, and round fitting, the making of calipers, and the use of taps and dies. After this course the principles in electrical construction are taken, and models of galvanometers, rheostats, voltmeters, dynamos, and motors are made. Instruction is also given in the theory of mechanism, and the elements of machine design, followed by the study of the strength and resistance of materials, and work in the testing laboratory.

*Trade School.*—The aim of this department is to give a thorough grounding in the principles of a mechanical trade, and sufficient practice in its different operations to produce a fair amount of hand skill.

*Carpentry.*—Practice is given in the use of saws, planes, and laying out tools, followed by a course in joint work. Then some models of framing are made, partitions are set and bridged, and floors laid. Door and window frames are made and placed in the partitions, which are sheathed, clap-boarded, shingle covered and corniced; and lastly interior trimming is taken up in the forms of stairways, wainscots, &c.



*Bricklaying.*—The pupils are first taught to handle the trowel and to spread mortar, exercise is then given in building 9-in., 14-in., and 18-in. walls with square and blocked ends, and with a returned corner. Then arches in walls of the same thickness are built, and later flues, fireplaces; setting eills and corbelling. Each pupil works on a separate section of wall, and no attempt is made to do rapid work; but tests are given towards the end of the course, by pupils being placed side by side on a long wall, and a greater speed is then attempted. Instruction is also given upon the strength of walls, theory of arches, properties and proportions of limes and cements, and of mortar made therewith.

*Plastering.*—In this branch instruction is given in scratch-coating, laying off, browning, and hard finishing, and in running and uniting small cornice mouldings. The surfaces for plastering are formed of stud partitions, lathed in the usual manner, and arranged to present the conditions of an ordinary room.

*Plumbing.*—The plumber's shop is equipped for about fifty pupils, each one having a gas furnace for melting solder, and a drawer holding a set of tools. The work includes the use of tools, preparing wiping cloths, trimming soldering iron, brass, iron, lead and tin, making solder, soldering seams, making cup-joint over cast joint, straight wiped-joint, flange joint and branch joint; working sheet lead into bends, traps, service boxes and safes, lining tanks, caulking iron pipe joints, and bending with sand and kinking irons. Instruction is also given in the proper management of drain, soil, and waste pipes, trapping and ventilating the same, supply pipes, boilers, tanks, fixtures, pumps; and errors in plumbing are explained.

*Mason's Work.*—The instruction in stone-cutting includes straight surface cutting, finishing in various ways, chamfering, moulding, and circular work. The course in stone-carving covers the principles of ornamental designs and modelling; and previous to admission to this class pupils have to pass the freehand-drawing class in the Art Department.

*Painter's Work.*—The equipment of this branch consists of partitions, containing doors, windows, and wainscoting. The course includes the preparation of surfaces, mixing paints, plain painting on wood, brick, and metal surfaces; and later, hard-wood polishing, flattening, polish white, gilding, lining, graining, and paper-hanging. Instruction is given on the harmony of colours, mixing of colours, properties of oil and dryers, and the various materials used in painting.

*Science and Technology.*—Instruction in geometry is given, which deals with the properties of lines, angles, and plane figures.

*Chemistry.*—This course comprises the laws of chemical combination, and the properties of the elements and compounds of inorganic chemistry, special attention being given to the application of chemistry in manufacturing processes.

*Electrical Construction.*—In this subject a knowledge of the principles of dynamic electricity and magnetism is afforded. The lectures take up the analysis of the magnetic field and lines of force, magnetic circuit, properties of electric current, electric magnet, induced electro-motive force, electrical units and work of current, with the

application of these principles to the construction of primary and secondary batteries, telephones, telegraphs, dynamos, motors, transformers, measuring instruments, arc and incandescent lighting systems. The laboratory work deals with the verification of the laws of magnets and of induction, distribution of lines of force, &c.

*Applied Mechanics.*—Strength of materials and their behaviour under various strains: resistance to tension; compression, shearing, and theory of beams, cantilevers, &c., and the general application of these principles to building construction.

*Metallurgy of Iron and Steel.*—Properties of metals, ores, fuels, blast furnace, puddling, Bessemer, open hearth, and the crucible process.

*Art Department.*—The object of this department is to give thorough instruction in freehand drawing and colouring, architectural and mechanical drawing, technical and decorative design, clay modelling, wood-carving, and needlework. The classes occupy the entire fourth floor, half of the sixth, two rooms on the fifth, and one room on the third floor of the main building, comprising in all fifteen studios and rooms especially fitted for the requirements of the various classes. Seven rooms are occupied by classes in architectural and mechanical drawing, wood-carving, water-colour, design, and needlework. Four studios with a north light are appropriated to elementary classes for light-and-shade drawing, and for clay modelling: and the large art hall on the upper floor, lighted from the roof, is arranged for advanced work from the antique and from life. The school is intended for those who wish to pursue, thoroughly and systematically, any branch or division of art work, and the courses of study are arranged to meet the requirements of three classes of pupils—viz. those who give to the work five days per week; those who give only two or three half-days per week; and those who give but three evenings per week. A regular art course is arranged for pupils who wish a thorough training in light-and-shade drawing, colouring, and perspective, with work from the antique and from life. During the first year the study is directed principally to the choice of picturesque subjects, to perspective (broad) effects of light and shade, and to the working of simple media. In the more advanced stages sketching is considered in its relation to illustration and composition. The course of study in architectural drawing affords students that training in drawing and design and the principles of building construction which shall prepare them for the work of an architect's office, or for an advanced course in architecture. The student is taught thorough and practical draughtsmanship, and he is furnished with all the elementary principles of science and art, from which advance may be made to a comprehensive knowledge of architecture. There is a Mechanical Drawing course, which includes the principles of machine design and construction; there is a course in Applied Design, which provides instruction in decorative design and methods of practical application; there is a course in Wood-Carving, which meets the needs of those who desire a knowledge of technical methods of wood-carving and cabinet-work. In the course for Clay Modelling special arrangements are made for the study of working in clay. The work is conducted in four divisions. The first is intended to supplement freehand drawing from the antique and from life, and to



provide training for those wishing to make a speciality of advanced work in clay. The second is for pupils of the normal class, who are instructed in the modelling of type forms, fruit, &c., and otherwise prepared to teach elementary claywork in the public schools. The third is planned to meet the requirements of pupils in the architectural and the wood carving classes, and also those of the technical high school. The fourth division is for pupils of the evening classes, and the course is designed to give artistic training which shall be specially adapted to meet the needs of artisans and designers in silver, brass, iron, stone, wood, and the numerous other branches of manufactured work to which modelled ornament is applicable.

*Domestic Science.*—It is the purpose of the department of domestic science to afford girls and women opportunities for such training as will best supplement the education usually gained in their school life, and better prepare them to make house-keeping the high art it should be. To this end, courses of instruction in cooking, household economy, laundry work, hygiene and home nursing, plain sewing, millinery, and dressmaking have been established to encourage pupils to observe and judge for themselves, and thereby gain self-reliance. The situation of the rooms devoted to this department is on the third and sixth floors. They are large, sunny, well lighted, and ventilated, and fully supplied with apparatus essential for good work.

The remaining floors of the main building are occupied by a Technical Museum, a Library, the Thrift Office and Lunch-room, and the Department of Commerce.

The Museum is on the sixth floor and measures 81 ft. by 46 ft., and receives light from windows on all sides. It gives accommodation for eight large horizontal cases and fourteen smaller vertical cases, with wall cases under the windows or end walls. The Library is on the first floor, and its dimensions are :—Reading-room, 48 ft. by 45 ft.; reference-room, 45 ft. by 32 ft.; lending library, 47 ft. by 45 ft. The Thrift Office and Lunch-room are located in the basement. The Department of Commerce occupies rooms in a portion of the third floor, in which stenography, type-writing, and general commercial business are taught; and, in order to secure the best results, no students under the age of seventeen are received, nor any who cannot pass an examination in composition and spelling.

#### THE JOHN'S-HOPKINS HOSPITAL, BALTIMORE.

The group of buildings bearing the above name ranks with the largest and most perfect institutions of its class, being the development of a scheme embodying all the latest and best methods of planning which experience could render possible. The hospital is open to all in the city of Baltimore and environs, without regard to age, sex, or colour, who may require medical or surgical treatment; and who can be received without peril to other inmates, and free of charge, for such periods of time as may be necessary. It also provides for patients who are in a position to make compensation for the room and attention they may require: the funds so raised being appropriated to the establishment of a training school for nurses and provision for

buildings in the vicinity for the reception of convalescent patients. Before commencing building operations the Committee conferred with several of the most distinguished physicians in different parts of the country, who had made hospital construction a special study, each of whom contributed an illustrated report on the subject after visiting and studying the best existing examples of European hospitals.

The grounds of the hospital cover a space equal to four entire blocks, and contain about fourteen acres, having a frontage on Broadway of 709 ft. and a depth of 856 ft. The elevation of the side at the gateway is 94 ft. above mean tide, at base of main building 108 ft., rising in the rear to 115 ft. The level of the ward-room floors is 124 ft., and the dome 300 ft. The building materials employed in the part of the structure now completed are about twenty millions of bricks and thirty thousand barrels of cement, three hundred million feet of timber, and nearly five million pounds' weight of wrought and cast iron. There are six miles of underground drain-pipes and fifty miles of other kinds of piping. These pipes are nearly all exposed in a large duct branching in the required directions. The heating is effected by a hot-water system, the largest pipes for which are 26 in. in diameter, wrapped in one inch of felt, and supported on rollers to allow for expansion and contraction, with specially made elbows for expansion at the connection with the boiler.

*Administrative Block.*—The principal entrance to this portion of the Hospital is at the centre of the west front. The main floor contains offices, library, and reception rooms. Second floor: rooms for resident medical officers. Third floor: rooms for resident medical students, bath-rooms and closets being placed in the rear projection. At the main floor level and across the corridor is the Apothecary's Block, containing offices, dining-room, pharmacy, and apothecaries' rooms; and eighteen rooms for female servants, with bath-rooms. At the end of the corridor is the Nurses' Home. The main floor contains parlour, library, rooms for the superintendent of nurses, and head nurses. In the basement: kitchen, dining-room, lecture-room, &c. The second and third floors contain forty-four rooms for nurses, with bath-rooms and closets. Near the opposite end of this corridor is the Bath House, with Turkish, Russian, and special baths, the basement being fitted with common bath-rooms.

The male pay wards occupy the north-west corner, and comprise a block (accessible by a short corridor) of officers' bed-rooms and rooms for pay patients; the female pay patients being placed in a similar block placed symmetrically in the south-west corner. The kitchen block has kitchen, scullery, refrigerators, stove-room, &c., and on the upper floor dining-rooms for resident help. Basement provides space for baking, pastry-room, bread-room, meat and stores. Descending to cellar floor, we find the boiler vaults, which contain water-meters, fillers, coal vaults, steam ash-lift, four hot-water boilers for general heating, and three steam boilers which are designed to heat bath boilers, ventilator coils, and bath-house.

*Amphitheatre and Dispensary.*—The pipe tunnel contains hot water, steam waste, gas, and water, pipes. The wards are placed in a line running from west to east, with



convenient spaces for light and air between each block. The Octagon ward contains general ward, central hall, lavatory, nurses', and other closets, patients' clothes-room, diet kitchen, dining-rooms—one room being set apart for the coloured patients—and two special-cases wards. The second storey is similarly planned. The common wards at present existing are three in number, and are placed parallel with each other, and connect with a continuous, wide, and well-lighted corridor.

The Isolating ward is at the end of this corridor, and contains twenty rooms for patients, two nurses' rooms, bath-room, diet kitchen, nurses' closets, and linen-room. The three rooms on the north-west corner have perforated floors. In the blocks on the north boundary are the amphitheatre and dispensary, the former containing lecture room, small operating-room, consulting and recovery rooms, accident department, pharmacy, surgeons' and physicians' rooms, closets and baths. In an isolated block on the corners of the eastern boundary are the pathological building and the laundry.

The wards are built on the one-storey plan, with basement below and attic above, and only one ward in each building. The materials used in the construction are Baltimore red bricks, terra-cotta, and bluestone; the roofs are slated, with a sparing use of copper and galvanised iron. The terra-cotta work in mouldings and pilasters has no special merit; and with regard to the general architectural design, it is to be regretted that more thought was not given to the character, not only of the details, but of the controlling features, in the composition of a group of buildings of this magnitude. The construction of the dome is of iron, with commonplace ornaments, and the enriched plaster-work in the interior of the rooms is executed in some selections of stock enrichments. The floors of bath-rooms, water-closets, and lavatories are of asphalt. The floors of main kitchen, and all floors in connection with the servants' working departments, are of concrete finished with a smooth surface. The ward floors and rooms for the sick are laid with edge grain Georgia pine  $1\frac{1}{2}$  in. thick, which was soaked in water for six months, and then preserved dry for several years before being dressed for use, in order to ensure the removal of all soluble matters through seasoning. The walling is, for the most part, plastered with three-coat work, finished with a hard surface, and painted in oils. In all rooms in which wooden beams are used for the ceilings wire netting is employed in lieu of wooden lathing, in order to prevent cracking, as well as to offer greater resistance in case of fire. The stairways in the wards are of iron, with a layer of asphalt 1 in. thick in the treads. The woodwork in the finishings is of ash; and plain-chamfered or rounded mouldings, which do not give catch-places for dust, and are easily cleaned by rubbing down with a damp cloth, are used, all hard wood being finished in hard oil.

*Sewage Disposal and House Drainage.*—Baltimore has no system of sewage. In the majority of the houses the waste water from kitchen sinks, lavatories, baths, laundries, &c., is allowed to run in the open gutters, while excreta are discharged into privy pits, wells, cesspools, or boxes. Some of these are comparatively watertight, and are cleaned out at stated intervals, or when they become full and offensive. Many of them allow of more or less leakage of their contents into the surrounding soil,

while some are in the form of deep wells, extending to the underlying gravel, and are seldom or never cleaned out. In arranging for the disposal of the waste water from the various buildings, the water-closets and ward-sinks sewage is kept distinct from that coming from sinks and wash-basins.

The discharges from ward water-closets and sinks, and from all water-closets and housemaids' sinks, in the administration building, the nurses' home, the apothecaries' block, and the kitchen, are conveyed by a separate system of iron pipes from each building to an iron pipe, which runs in the pipe tunnel from the isolating ward on the east to the point where the corridor to the female pay ward is given off. Here the pipe leaves the tunnel and enters the ground, and passes to a well west of the nurses' home. The well is 7 ft. in diameter, and 71 ft. deep. At the bottom it enters a stratum of coarse gravel and pebbles, through which water is constantly flowing towards the south-west.

The well for the Pathological building is 5 ft. in diameter and 75 ft. deep. That for the amphitheatre and dispensary is 6 ft. in diameter and 77 ft. deep. The water from wash-basins, kitchen sinks, &c., is conveyed by a separate system of pipes to the sheet gutters, or to the 16-in. pipe drain about 10 ft. beyond the silt trap in the corner of the grounds. All the soil pipes are trapped near the wells into which they discharge, and have a fresh-air inlet inside the trap. The wells are also ventilated with pipes taken up above the level of the windows in the building.

The water-closets are "wash-out" closets, being what is known as the "Brighton" pattern. Bath tubs are of iron, and not enclosed with woodwork; they stand upon long legs clear of the floor, and are movable, being unconnected with the plumbing. The sinks are of porcelain. In all wards the vertical soil and trap vent pipe is placed in a kind of small closet, or ventilating shaft, which extends above the roof, and has in it an accelerating steam coil to secure a constant upward current. Into this shaft pass ventilating tubes from the water-closets and urinals, and the working of this has proved very satisfactory.\*

All the soil pipes were delivered on the ground as they came from the foundry, without being tarred or painted. They were then tested by passing through each length, or section, a swab dipped in a mixture of linseed oil and red lead, the slightest defect in the casting being indicated by an appearance of an oily stain on the external surface of the pipe so tested.

*Common Wards.*—The main ward-room, 99 ft. 6. in. long by 27 ft. 6 in. wide, 15 ft. high at side walls and 16 ft. high in the clear in the centre, contains 24 beds, giving each bed 7 ft. 6 in. of wall-space, 106 sq. ft. of floor area, and 1,768 cub. ft. air space [fig. 183].

The method of heating and ventilating these wards is one of importance and interest. The heating is effected by hot water coming from the mains in the pipe tunnel and passing through coils of 3 in. of cast-iron pipe arranged in stacks in the basement

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\* The drainage scheme is by no means an ideal one, but it was adopted as a temporary measure until the city provide a proper system of sewers; and all pipes are therefore laid with reference to connections with sewers when constructed by the city authorities.—A. A. C.



against the outer walls. Under ordinary circumstances, in cold weather the average temperature in these coils is  $150^{\circ}$  F., but it can be regulated to any degree above that of the external air, by reducing the velocity of the current of hot water passing through it, which is readily done by the use of valves placed on the floor and return pipe of each coil. The fresh-air supply is admitted through openings in the exterior walls of the basement of the ward, coming from the green lawn which surrounds the wards. This opening in the wall is protected by wire netting, and communicates with a galvanised iron flue, which passes downward to open in the chamber beneath the heating coil, and also upward directly to the fresh-air register in the ward. In this flue, opposite the external openings, a cast-iron register is fixed, by the use of which a careful regulation is exercised, and it is possible to give one pair of beds a temperature of  $70^{\circ}$  and another pair in the same room at a little distance a temperature of  $60^{\circ}$  F., to suit the needs of the different cases.

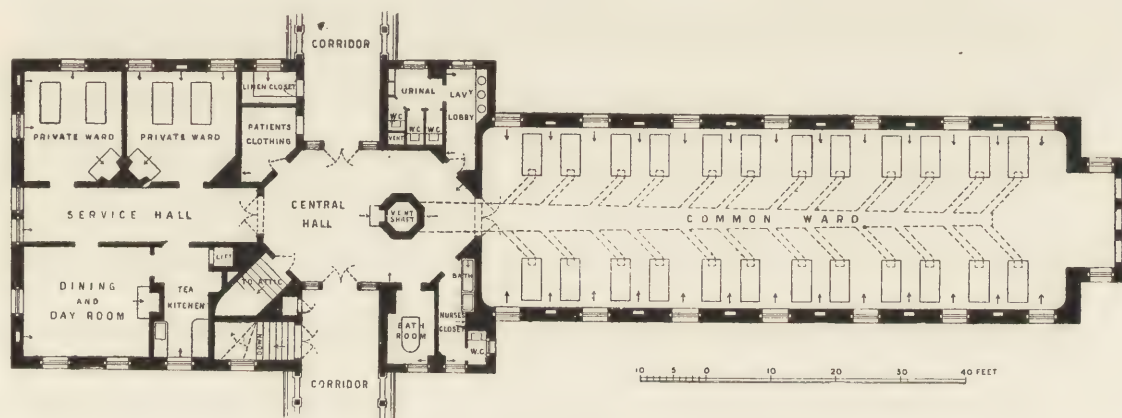


FIG. 183.—THE JOHN'S-HOPKINS HOSPITAL, BALTIMORE.

(Plan of a Common Ward.)

The 80,000 gallons of water contained in this heating apparatus go round and round, carrying heat from the furnace to the wards. But every building has its own independent means of ventilation, and it is not possible to pass from one ward into another without going into the open air on the way, so that foul air, if any, cannot spread from one block to another; nevertheless, the buildings are so closely connected by corridors and underground tunnels, that patients walking from one building to another are not exposed to inclement weather or cold air, and the food is not exposed. One of the peculiarities of the wards is that all the service rooms are collected at the north end, leaving the south free of all obstructions, and fully exposed to the sun; the end of the ward being formed into a large bay window, which can be warmed, so that the patients who are able to sit there and overlook the central garden, can be thoroughly comfortable. The wards are all arranged for the best possible methods of cleansing, and to prevent accumulation of dust in corners and in crevices. Corners are in a sense dispensed with, and easy curves substituted. This is also done at the junction

of the floor and walls, as well as at ceiling angles. The door mouldings, architraves to windows, and other finishings, are all designed in rounded forms, instead of the sharp and undercut members which give recesses that it is almost impossible to clean.

One ward is especially designed for contagious cases or those of an offensive nature. In this block each patient occupies a room opening into a wide corridor through which fresh air is constantly passing. Each room is provided with a dry closet apparatus fitted in a separate closet, which is lined with metal throughout and is connected with a large ventilating trunk running up through the roof. The apparatus is of a very simple form and is made movable. It is, however, fixed so that the patient cannot disturb or move it; there is a small door opening at the back into the corridor, through which the pan can be drawn and taken away without passing through any of the wards. There are numerous other details about the isolation ward which are worthy of notice; also about the pay ward, the octagonal ward, and the peculiar fittings and conveniences of the kitchen, laundry, apothecaries' building, &c.

The hospital not only provides rooms for the sick, but gives means for higher medical education. There is a large amphitheatre with adjacent rooms for the reception of "accidents" and "emergencies" of all kinds; and provision is made for thirty students to reside in the hospital and devote themselves under proper guidance to the study of disease and the practical care of the sick.

Many of the arrangements of the hospital have been contrived with a view to instructional purposes. The hospital is a great laboratory for teaching the practical application of the laws of hygiene to heating, ventilation, house drainage, and other sanitary matters. All pipes and traps are either exposed to view or visible by merely opening a door, and in the tunnel beneath the corridor one can study at leisure the complicated, and at the same time perfect, arrangements for gas, steam, water, sewage, &c., which are usually buried, remaining a profound mystery to every one. In one portion of the buildings is provided quarters for the exclusive use of female nurses, in which each nurse can have her own comfortable bed-room, with use of a common parlour, library, dining-room, and bath-rooms. Here, too, is a training kitchen and a lecture-room to aid in the work of instruction. Another feature of the establishment is the dispensary building. This is a large block on the north front, consisting of a capacious central waiting-room, surrounded by a number of smaller rooms for the use of the physicians and surgeons who have to examine and prescribe for the patients, and a small apothecaries' room for the dispensing of medicines ordered.

#### THE FIRST METHODIST EPISCOPAL CHURCH, BALTIMORE.

This magnificent church, seen from either side, presents the appearance of some great historic pile, with its broad majestic-like colonnades, its wide massive flights of steps and tile roofs, above which rises with impressive dignity and grandeur, unsurpassed by any ecclesiastical structure in the United States, the great belfry tower to the height of 186 ft. The extent of the site upon which it stands is 184 ft. by 150 ft., and the cost of the



property was almost \$ 250,000. The tower contains 6,000 tons of cut stone-work, and the walls are built of the same thickness throughout their whole height, and where offsets occur on the outside, corresponding oversailing courses are found on the inside. The roof is covered with Spanish-shaped tiles of Roman red colour, contrasting very pleasantly with the green grass and the quiet grey tone of the walling, while the exterior of the edifice is imposing on account of its elegant simplicity and massive proportions. The interior is the delight of all, being composed of interesting and beautiful parts. The entire building includes the main auditorium, the school, church parlours, and reception-rooms. The auditorium, which is a marvel of architectural beauty, is elliptical in plan, with a well-proportioned gallery around all sides except where the great organ occupies the space above and behind the pulpit platform. The organ is a copy of one in Ravenna. The details of the interior tend towards a Classic or Renaissance treatment. The colouring is rich and warm without being brilliant. Pompeian red, which is the base of the colouring scheme of the walls, tones off to old brass and gold in the frieze with a particularly pleasing effect. The cornice and frieze are artistic combinations of carving, stucco, and metals. The windows in the frieze, which are of costly stained glass, are reproductions of mosaics of the fifth century, now preserved in the Christian Museum of the Lateran at Rome. The lighting is produced by a crown of 340 gas jets, making a circle of flame just below the frieze, an arrangement by which it is said to be impossible to cast a shadow in any part of the church.

The dome or vault is in the form of a flattened ellipse, designed after that of St. Sophia at Constantinople. This is interpreted in blue and gold, and is an exact representation of the firmament as it appeared at 3 o'clock A.M. on Sunday, 6th November 1887, the date of the dedication of the church. Every star that was visible to the naked eye at that hour occupies its relative position and has its relative size upon the surface of the dome. The dome being made of a flatter crown than a semicircle, occasioned much difficulty in ascertaining the precise position of each star. The true points have, however, been accurately ascertained by the use of a series of lines, radiating from one common centre to each individual star, as set out upon a diagram of the true curve, the intersections of these lines with the flatter curve, when drawn in correct position, marking the points or position which were transferred to and are seen in the ceiling now completed. The white light of the "Milky Way," with its numerous stars, is distinctly represented, and though 719 planets and stars are visible, there is no appearance of being crowded, since the ceiling upon which they are painted contains over 25,000 sq. ft. of surface. The artists have been careful to preserve the shades of colouring peculiar to the different planets. Mars, shining with its own peculiar red light, is quickly recognised. This idea of representing the firmament was originated by, and the successful result is due to, Dr. Goucher. The chart of the heavens was made by Mr. Prentiss, of the Astronomical Department of the Government at Washington, under the direction of Dr. Simon Newcomb, Professor of Astronomy in the John's-Hopkins University. Every star mentioned in the Scriptures appears on the dome. In pursuance of observations by

astronomers, it is asserted that a wonderful fact or suggestive coincidence was brought to light by the discovery that the heavens as they appear in the representation in the church—and therefore as they appeared on the morning of the 6th November 1887—are exactly as they were at the birth of Christ. Every star that illumined the plains of Judea, with one exception, occupies now the same place as it did upon that memorable occasion, the exception being the star of Bethlehem! The dome is carried forward on gilded corbels or consoles, and tongues of golden flame encircle the whole vault with magnificent effect. On each side of the auditorium there are four windows, glazed as memorials to the ancestral line of pastors who administered to the congregation of the First Methodist Episcopal Church in the various places of worship.

The woodwork of the interior of the church is of solid black birch, richly carved. In place of the ordinary regulation pews, upholstered chairs are used, which are more comfortable, though perhaps not so ecclesiastical-looking. The upholstery, executed in Pompeian red, and imported from mills in Belgium, harmonises perfectly with the carpet and walls. The carpet was manufactured from a special design prepared for the purpose. The forum and vestibule are paved with glazed cream-coloured tiles, which make a very bright and pleasant floor surface.

The ventilation of the church is one of its most interesting features. Beneath each chair is a small circular flue, partly screened with a zinc cover or cap. These flues are so arranged that the occupant of each seat can regulate his own temperature by opening or closing the flue with his foot. In summer these heaters act as ventilators, admitting 1,000 cub. ft. of air for every person every hour. This air is of lower temperature than the natural atmosphere; the building can thus be kept very cool, without causing any perceptible draught. The scheme, which is a somewhat novel one, is found to work admirably, and is worthy of more frequent adoption in buildings of a public character.\*

#### CHILDREN'S WARD, PRESBYTERIAN HOSPITAL, PHILADELPHIA.

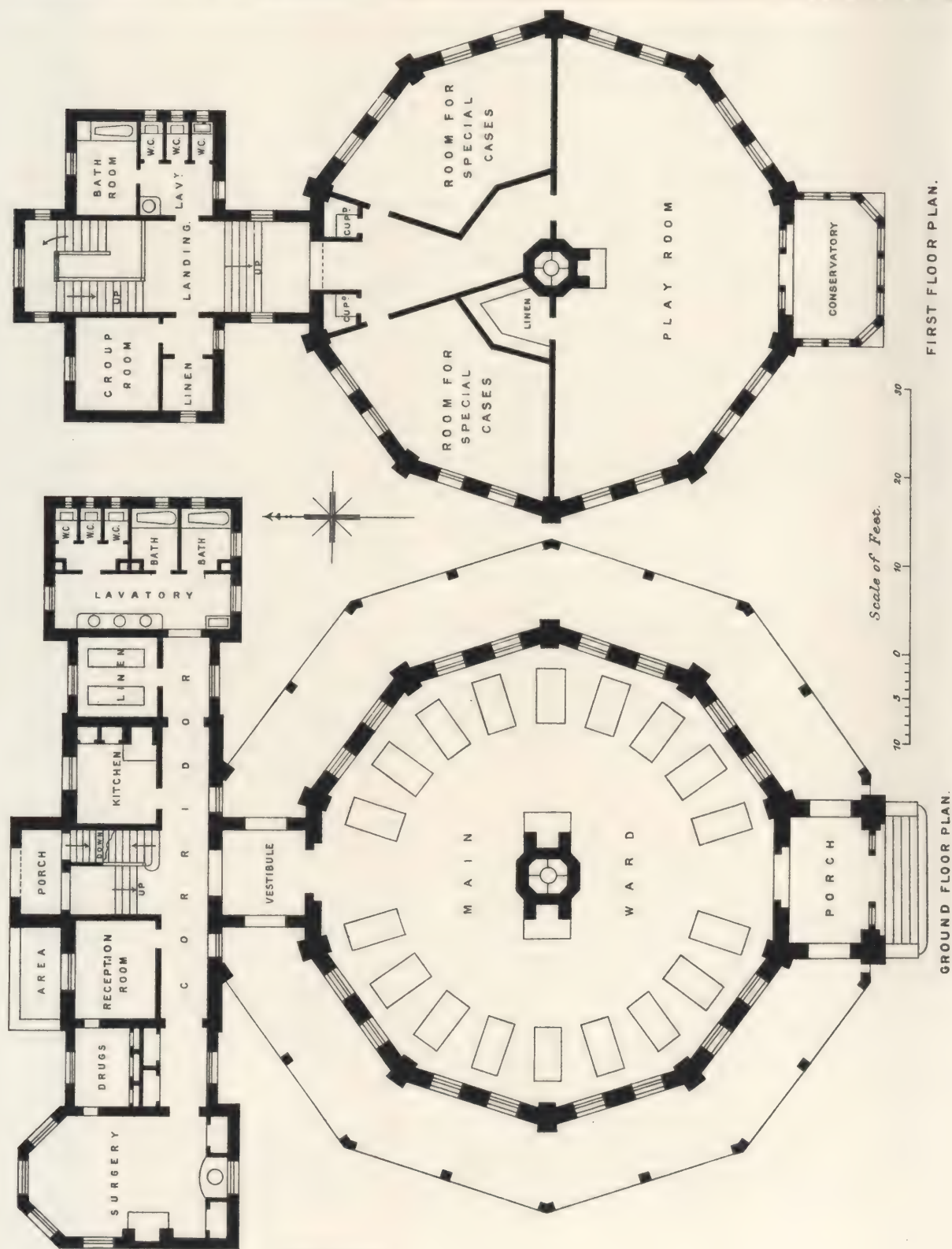
This building is noted for its simple plan and efficient accommodation [Illustn. x]. The materials employed for the exterior are pressed brick and terra-cotta trimmings, with slate roofs. The exterior of the main ward and toilet-room is wainscoted with tiles to a height of 6 ft., the toilet-room floor also being executed in tiles. The plastering throughout is finished with a hard sand face. The flooring of the main ward is formed of wrought-iron beams, filled in between with hollow tile fireproof flat arches, set in

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\* Here follow, in Mr. Cox's MS. Report, a description of the Goucher Hall, or Women's College, which adjoins the church above described; and of the Bennet Hall and the College Home or Boarding Hall, in Baltimore. The Report also contains descriptions of the World Building, of the Madison Square Gardens Amphitheatre, and of the Broadway Theatre, in New York: with many diagrams of constructive details which have not been included in this print of it.



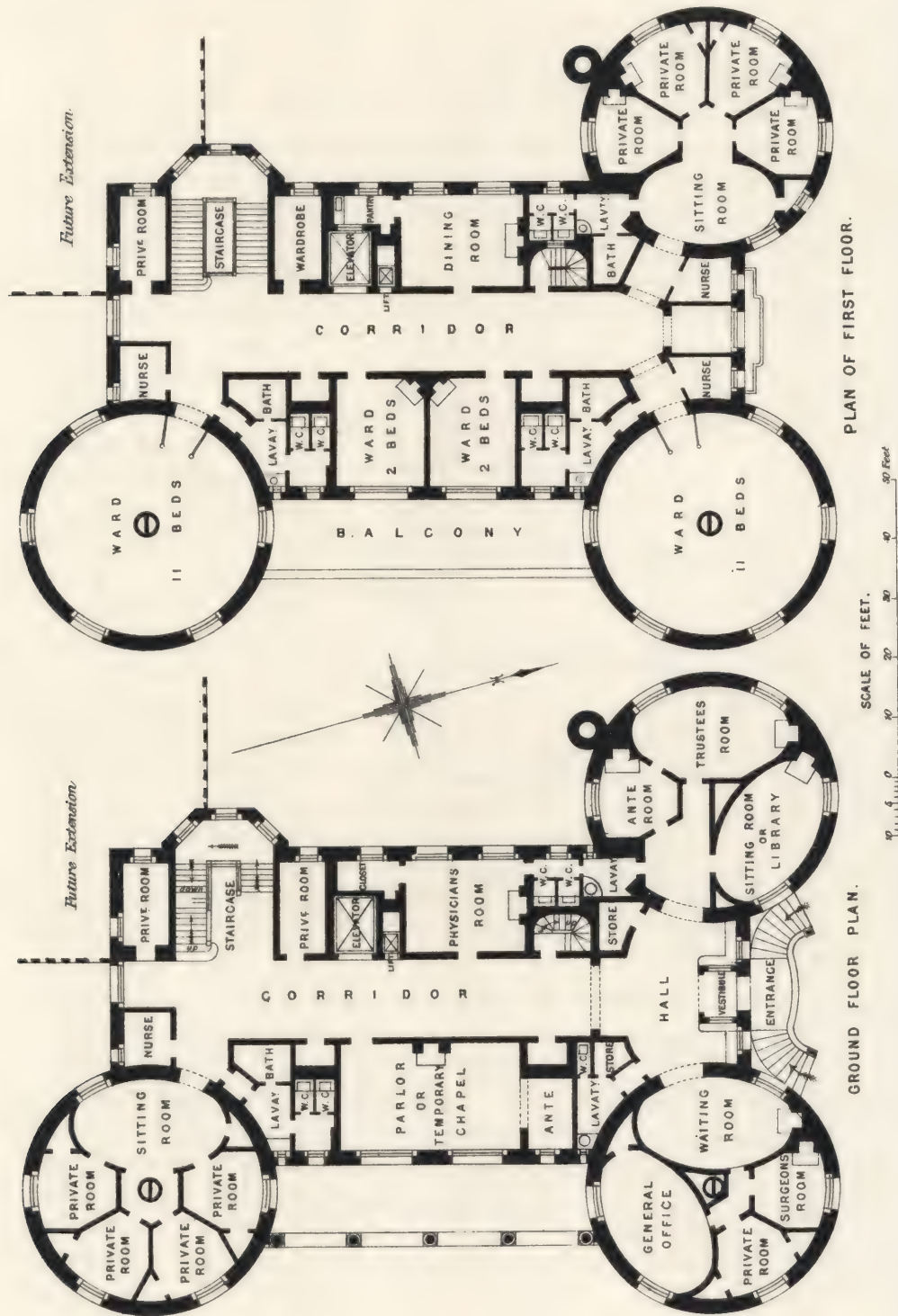




CHILDREN'S WARD, PRESBYTERIAN HOSPITAL, PHILADELPHIA.



[Page 380 ]



THE CANCER HOSPITAL, NEW YORK.

[Page 383]





cement. It was intended to receive a tile floor, but white maple wood flooring in narrow widths on fir joists was substituted.

The windows of the ward are fitted with double sashes, with a space of 8 in. between the two glass surfaces. Each window has a transom-light, which reaches up to, and is practically flush with, the ceiling of the ward, the transoms all being so arranged that they open above the lean-to roof of the porch or verandah encircling the ward. There are also transom-lights over all doors in the building. The foul air is removed from this ward through flues in the angles of the room, ten in number, each 13 in. by 9 in., which are connected with a foul-air duct of 18 ft. superficial area, placed directly under the fresh-air duct in the cellar, the two ducts being divided with brick arch and concrete cemented floor, and the foul-air duct has two connections with the aspirating shaft in the centre of

the block. The shaft measures 4 ft. internal diameter, and is 64 ft. high; it is finished on the top of the roof as an octagon, with a moulded cornice and base, and panelled sides, forming a pleasing termination to the roof, efficient for the purpose to which the flue is applied. In the flue is fixed a steam coil containing 150 ft. run of 1 in. diameter steam-pipe to assist in the discharge of foul air. It has also three open fireplaces connected with the two floors, two being in the ward and one in the play-room over. The vitiated air flues in the outer walls have each a valve-opening 12 in. by 17 in. at floor level and 12 in. by 12 in. at ceiling; and there are ten valves, each 9 in. by 12

in. at ceiling level, opening into the stack. The result of tests which have been made showed an average current at the floor openings of these ten flues (when all ceiling-valves were closed) of 165 ft. per minute; and a velocity in the fireplace flues (no fire in use) of 355 ft. per minute, temperature in rooms being 72° F. The play-rooms and the two rooms devoted to special cases on the upper floor are warmed and ventilated in a similar manner. The fresh-air supply to the nurses' room, the linen-room, and toilet-room in the wing building, is taken through sheet-iron ducts from the main fresh-air duct, and the ventilation is regulated by valves in the respective flues. These are all connected together in the roof-space, and carried into the brick air-flues in the kitchen chimney-stack.

There is accommodation for 27 beds, 18 in the main ward, and 4 in each of the

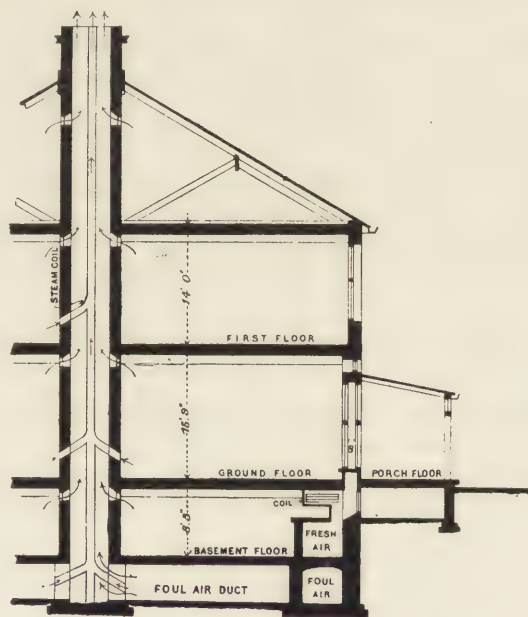


FIG. 184.—SECTION THROUGH CHILDREN'S WARD, PRESBYTERIAN HOSPITAL. [See Plans, Illustr. x.]

two wards on the upper floor, for special cases ; and one in a croup-room on the second floor. The play-room is bright, cheerful, and well lighted, and has a small conservatory opening out of one side with a southern aspect. The cost of the building, including furniture, was \$35,000, the gift of Mrs. John Wanamaker.

#### SCHOOL BUILDINGS, CLEVELAND.

These schools are classified into three groups, and consist of high schools, grammar schools, and primary schools. The high school is divided into four classes of one year each, viz. first, second, senior, and junior. The grammar schools consist of four grades of one year each, A B C D ; and the primary schools of four grades of one year each, A B C D. The ages of scholars in primary schools range from six to ten years, grammar schools ten to fourteen years, high schools fourteen and upwards.

There are about 50 blocks of school buildings of the classes named above, in which 700 teachers are employed, salaries per year ranging from \$400 to \$650 ; high schools salaries, \$800 to \$1600. Teachers are paid according to experience and not by results. The school fittings are of the most modern construction : convenient, and durable. The desks chiefly in use are of the "Regal" pattern. They are made in twelve sizes. This is done at a large expense in order that they may be more carefully graded to the different sizes of scholars, thus adding to their comfort and healthfulness. The back and seats being pressed in continuous sheets, the curves are perfect and symmetrical, and not a series of flat surfaces and angles, as in the old style of desks. The woodwork is made in the manner known as the "veneering process." This is the best method of construction known to the cabinet trade. Five pieces of birch or cherry cut from the log in continuous sheets by the "revolving process" are glued together and pressed into proper shapes by powerful presses, the grain of the alternating sheets running in opposite directions ; and it is by this method only that a solid top, solid back, and solid seat, each in one continuous unbroken surface, are secured. The design, smoothness, and freedom from sharp points or edges, strength, and durability of the castings used are unsurpassed ; and, being made of best Scotch iron, they have a large percentage of elasticity, and will bend before breaking. The legs are widely spread, giving greater firmness to the desk when fastened to the floor, and diminishing the danger of loosening, which continually occurs in desks where an improper strain is placed upon the screws, generally caused by reason of a too narrow base. The hinges are durable and noiseless, the bearings being square, strong, and accurately balanced, and the use of rubber to secure noiselessness is dispensed with in favour of an indestructible mechanical device which checks the downward motion of the seat just before the bearing surfaces come in contact, thus avoiding all noise. Each desk is furnished with flush top ink-wells. The bottle is securely locked in place, and the ink cannot be spilled by anything striking on the under-side. The cover is flush with the desk-top so as not to interfere with the removal of slates or books. Size of single desks for adults : length, 24 in. ; width of top, 15 in. ; height of top,



30 in.; height of seat front,  $17\frac{1}{2}$  in.; floor-space occupied, 30 in. For infants: length, 18 in.; width of the top, 12 in.; height of the top,  $21\frac{1}{4}$  in.; height of seat front, 11 in.; floor-space occupied, 25 in.

An example of school building will be seen in the plans [fig. 185], which by the kind permission of the architect to the Board of Education I have reproduced. This particular school is situated on Scranton Street, Cleveland, and is one of the recently erected and most perfect buildings of its kind.

At the principal entrances the openings are 7 ft. 6 in. wide, and the doors are hung folding. The two exits, each 8 ft. wide, are placed centrally on either side of the main

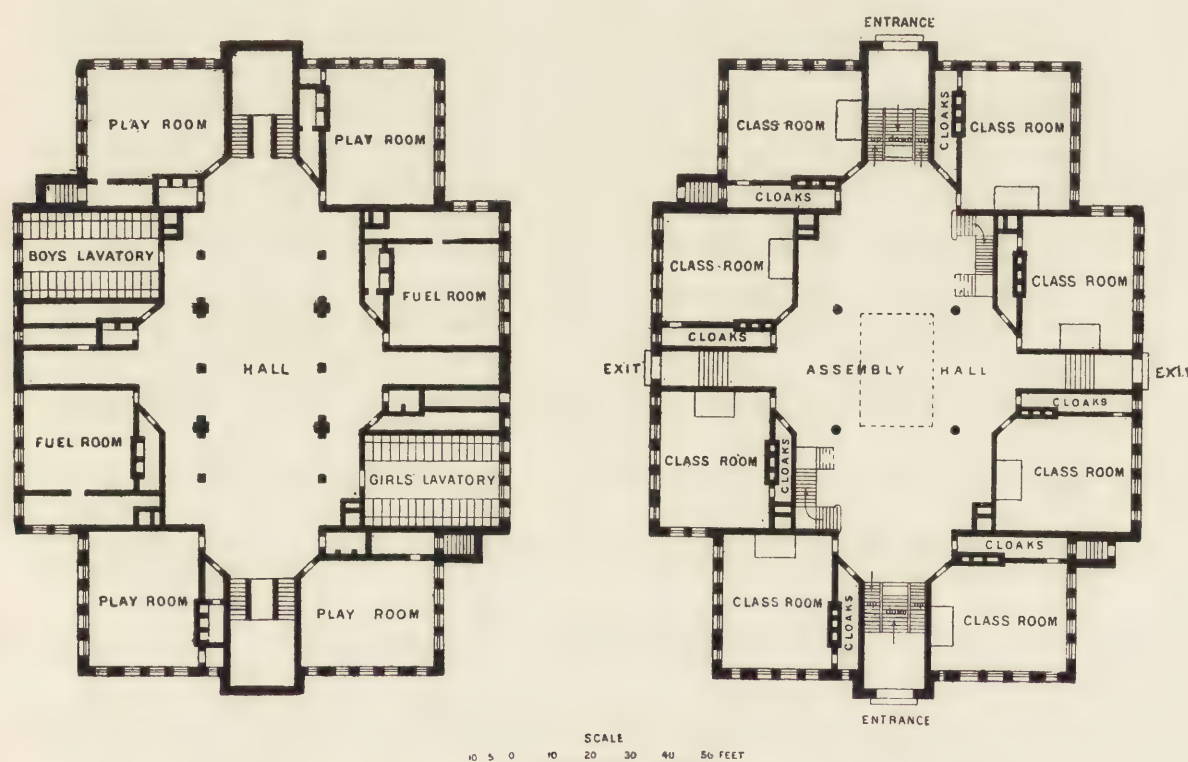


FIG. 185.—GRAMMAR SCHOOL, CLEVELAND, OHIO.

hall. Each class-room is provided with a separate cloak and hat room, and it is so arranged that pupils when dismissed pass directly out of the class-room into the cloak-room; thence, by a door opening at the opposite end, they enter the main hall at a point near the class-room door, and visible to the eye of the teacher. Two main stairways are each 15 ft. wide between walls. By examination of the plans it will be seen that the method adopted is not only simple but efficient; and forms a very perfect plan for a school building of this kind. The heights of the respective storeys are: Basement, 10 ft. 6 in. floor to floor. Ground-floor class-rooms, 15 ft. First-floor class-rooms, 15 ft. Second-floor space in roof, 10 ft. 6 in. to tie-beam.

The class-rooms afford about 220 cub. ft. of air-space for each pupil. Light is admitted by openings on the left and rear of seats, averaging 224 super. ft. of unobstructed light, which is equal to about one-seventh the area of total floor-space.

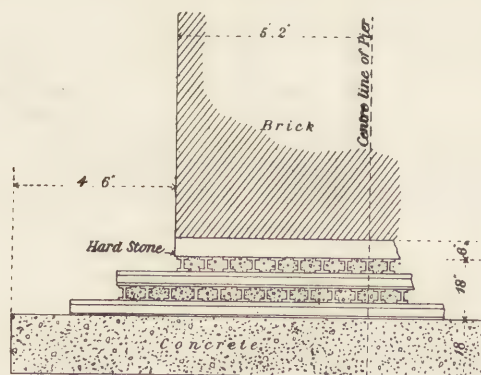
The ventilation is effected by means of fresh-air inlets and foul-air extraction shafts, constructed in the inner walls or partitions of the class-rooms, and connected with the heating apparatus located in the sub-basement; the air being changed every fifteen minutes and guaranteed  $70^{\circ}$  heat in zero weather.

Having given a general description of my tour, I have to express regret that time has been too short to allow of a fuller report on the various subjects, and that many of the buildings I visited have, from the same cause, not been described. The tour has been to me an exceedingly pleasant as well as a most instructive one, and I owe a large debt of gratitude to the Institute for the honour conferred upon me as a travelling student and as Holder of the Godwin Bursary.

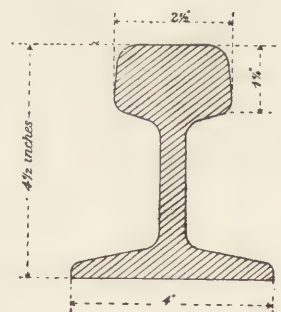
A. ARTHUR COX.

### CONSTRUCTIONAL AND OTHER NOTES.

*The "Rookery" Office Building, Chicago.*—It is interesting to note in the buildings of Chicago the change which has taken place in planning since the time when elevators were little or hardly known, and stairways were an important factor of the building, to the present, when elevators are indispensable and are the entire key to the modern plans. This is exemplified in all the large office buildings in Chicago. The "Rookery" block, for example, which is one of the highest and most



Section through Footings of Brick Pier.



Section through Steel Rails under Brick Pier.

FIG. 186.—THE "ROOKERY" BUILDING, CHICAGO.

recent structures used for office purposes, is eleven storeys in height; and each storey measures about 12 feet. The old buildings existing prior to the great fire were in many ways defective, but those of later date, and some now in course of erection, afford the best specimens of construction in the United States. Buildings of the kind have to be designed scientifically as regards the manner in which weights are distributed and the loads calculated; in fact, the problems of foundations found in Chicago are seldom met with in any other places. The sub-soil is composed of a black loamy clay, which on the surface is tolerably firm, but a few feet below, and in some parts to a depth of 12 to 15 feet, is quite unfavourable to building operations; and there are many places in which lines of soft earth cross the city, and require great care in planning where heavy weights are to be placed on the



foundations. The conditions under which the foundations of the "Rookery" building are formed were determined by the requirements of a cellar under the entire block; and as it was essential to keep the footings as shallow as possible, and not penetrate through the bed of clay, and also not to project into the cellar, it was necessary to adopt some method for distributing the load as much as possible in the smallest practicable depth. This was met by the application of steel rails placed in layers at right angles, in the manner shown in accompanying sketch [fig. 186].

Under the piers is laid a bed of cement concrete 18 inches thick, on top of which is placed a layer of steel rails spaced evenly at small intervals, and two feet shorter than the width of the concrete bed; then is laid another course of rails in an opposite direction; and again a third course, which is cut within a foot of the required width of the outer lines of the piers; and lastly a course which occupies a space a little larger than the area of the base of the pier. These rails are all thoroughly bedded and the spaces filled with cement concrete, which when set forms one homogeneous block. There is no deflection in the rails when laid on this plan, and on account of the small depth required it obviates the projection of the usual brick footings, which in this case would have reached considerably above the floor level of cellar, and have proved an obstruction in the various vaults.

The use of steel rails for this purpose is a new feature in building construction in the United States, and their introduction is appreciated by almost all who are engaged upon foundation work in treacherous soil.

The aggregate height of the building to the top of the front parapet is 162 feet. All round the walls are laid four lines of hoop iron at regular intervals, bedded into the masonry and fastened at joints and angles; and over all voids in the walls rows of iron beams are built in to equalise the pressure and to form ties. The interior offices receive light from a large open court, the sides of which are formed in fireproof construction, of iron beams and uprights encased in terra-cotta blocks; at each floor level a continuous line of 12-in. iron girder and 7-in. channel irons are bolted together to form a belt, making the whole enclosure a rigid frame of ironwork. The floors are framed across from the outer walls to an interior line of girders resting on iron columns or stanchions, which are placed in the thickness of the partitions, leaving the room space unobstructed. The beams in the building vary in depth in proportion to the loads they have to carry. The thickness of metal in the basement columns is  $2\frac{1}{4}$  in.; first and second floors 2 in.; third and fourth floors  $1\frac{3}{4}$  in.; fifth and sixth floors  $1\frac{1}{2}$  in.; and all above that height 1 in. The base plates for the feet of columns are  $4\frac{1}{2}$  in., tapering to  $2\frac{1}{2}$  in. thick, and 4 ft. 6 in. square. The columns are flanged at the various stages to receive the floor girders, the joints being made a few inches above the top flange, and the bed joints are laid with  $\frac{1}{4}$  in. thick sheet-lead.

Offices of the first class in this block rent at one dollar and a half to five dollars per square foot per annum. Leases run from one to five years, very seldom more than ten years. The elevators are calculated to run at the rate of 400 ft. per minute.

*Heating and Ventilation.*—The above sketch [fig. 187] shows the combined heating and ventilating schemes adopted at the Grace Hospital, Detroit. The heating of the general wards is 'indirect.' The radiators are placed in brick chambers in the basement, and are of ordinary vertical

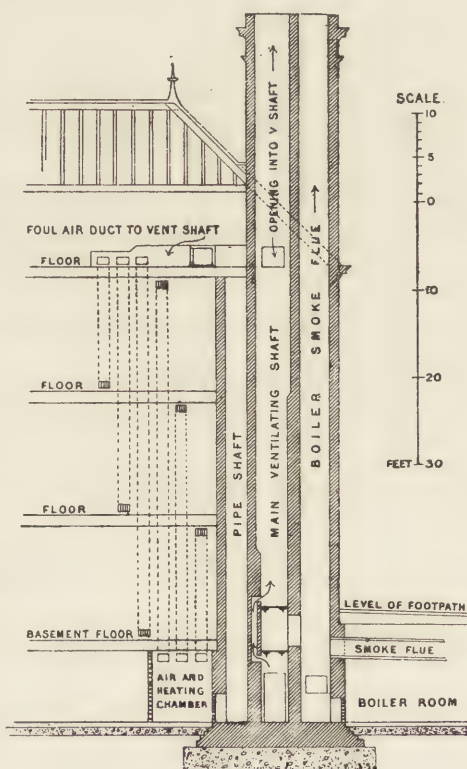


FIG. 187.—HEATING AND VENTILATING FLUES AT GRACE HOSPITAL, DETROIT. [See below.]

4 in. tube stagger pattern, each enclosed in a galvanised iron casing extending 18 in. below the base of radiator. The heated air passes up between the tubes and through the flues in the walls, being admitted through registers at the top of each room; each ward has three of these 24 in. by 12 in. flues, with a corresponding number of exhaust-flues at the floor level on the opposite side of the room. The exhaust-flues pass up in the wall-flues to the attic, where they connect with a galvanised iron duct leading to the main central ventilating shaft, in which an upward current is maintained by heat derived from the boiler smoke-flue at the back, and from the heated air-chamber in the basement. The steam to the radiators is furnished by two 70 horse-power tubular boilers.

*Air-mixing Flues.*—Fig. 188, No. 1, illustrates an air-mixing valve used in a school building at Honesdale, Philadelphia. It differs from other methods in one important particular: the cold air is made to pass over the coil, and consequently by its own gravity it falls into the warm air current that passes from the coil, whereby a thorough mixing is secured. The valve is worked—the handle being in the room—by a crank, the rod of which is fitted with a coarse screw thread which runs through a nut on the back of the valve. A collar and a nut at N hold the rod in a fixed position. The working of this valve is found to be very satisfactory, and its operation will be clearly defined on referring to No. 2 in

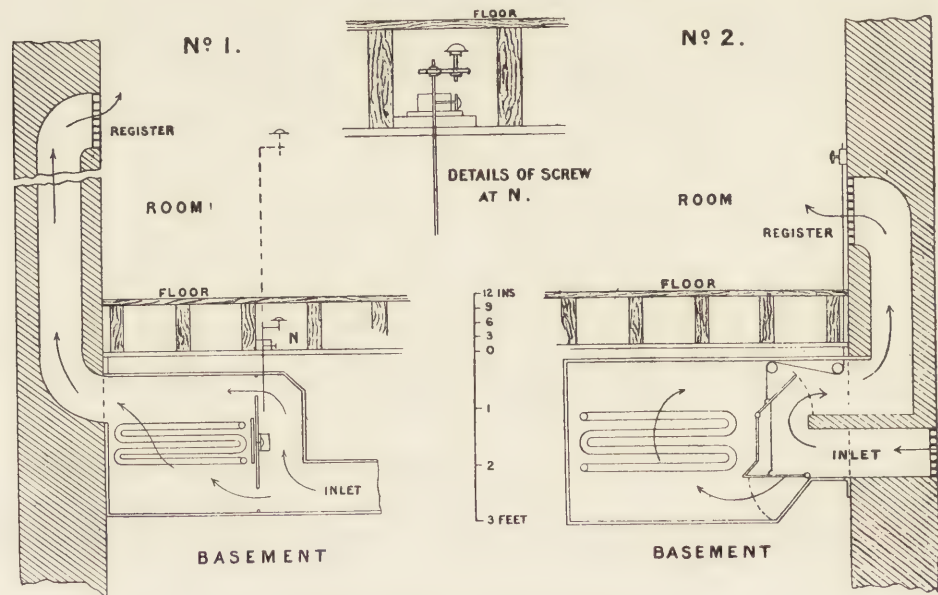


FIG. 188.—DETAILS OF AIR-MIXING FLUES.

fig. 188. The cold air is admitted directly from the outside wall through an opening provided and protected with an iron grating. If warm air is desired the chain is slackened off, allowing both flaps to fall simultaneously, which causes all the air to pass over and around the heating coil before passing up the flue into the room. By varying the position of the flaps between the two extremes, any desired temperature can be obtained.

Fig. 189, No. 3, is a section through a portion of the hall and wards of a lunatic asylum. A large fan worked by steam power is used to force the air into the corridor or plenum in the basement; the heating coils are divided into groups, one for each room, thus providing means for regulating the temperature in each room separately. No. 4 shows the air-mixing scheme adopted in the Bridgeport Hospital. The coil or radiator is set a foot or so from the wall, to allow sufficient room for the valve. When the handle D is down, the valve is closed, and all the cold air passes through the divisions of the coil; when drawn up, and held by the set screw, the valve can be adjusted to suit any desired degree of temperature. The method is an exceedingly simple one, and works well.

*A Grease-trap.*—The trap shown in fig. 190 is a simple cylinder built of hard brick, lined up to 6 in. above the water level with cement, the bottom also being cemented. The sewer connection is



made with two bends, so as to form a trap. The strainer is made of strong galvanised iron of heavy plate, and rests on a projecting rim of brick or metal bearers (the brick being the more practical method). The trap cover is simply of wood construction, and is fitted with a ring handle. The trap is not provided with an air-vent; it is found unnecessary so long as the receptacle is periodically

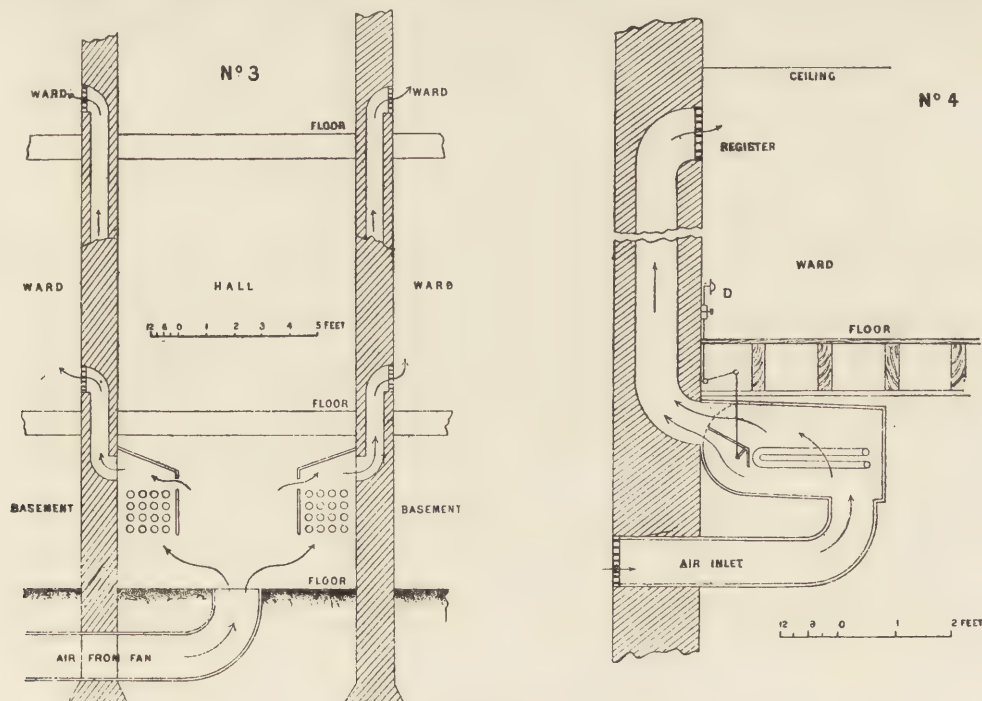


FIG. 189.—DETAILS OF AIR-MIXING FLUES.

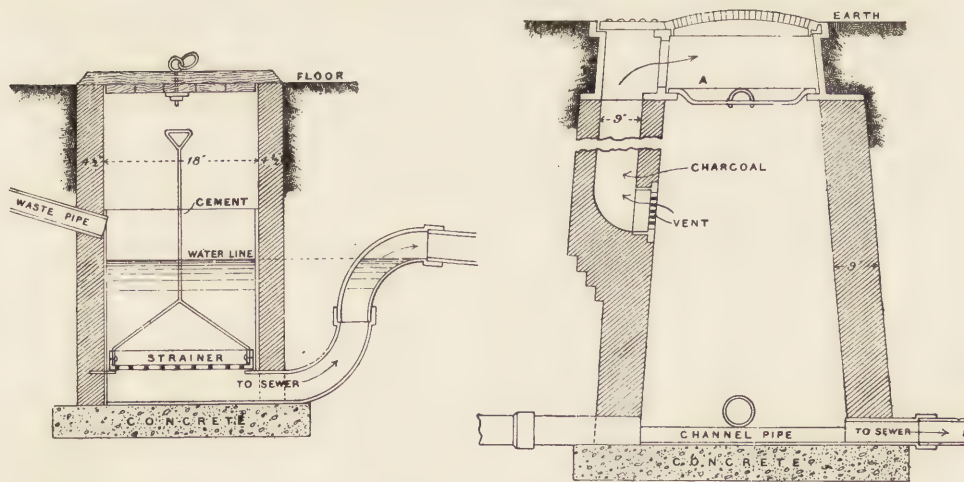


FIG. 190.—GREASE-TRAP CONSTRUCTED IN BRICK AND CEMENT.

FIG. 191.—MAN-HOLE WITH CHARCOAL VENT-SHAFT.

examined and cleared of its contents, to which attention should be given at least once a week. An iron rod is fitted to the strainer for removal when necessary; the grease is then removed, and the strainer cleaned with a brush or broom.

The improvement claimed in this man-hole is the vent-shaft, filled with charcoal or other disinfectant, through which all vapour and foul gases from the sewer pass before reaching the grating at the street level; and secondly, the closely fitted cover at A [fig. 191], which protects the sewer from any accumulation of rubbish, working as it often does through an ordinary grating. As the sewer gas rises in the man-hole, its escape is prevented by the pan under the iron grating, and it is forced back and down to the grating fixed in one side of the man-hole wall at the bottom of the flue; it then passes up through the charcoal, which deodorizes the gas and arrests all germs of disease coming from the sewer. The air finally escapes by the side opening under the perforated cover into the street.

A. ARTHUR COX.



LXXXVIII.

THE PRIORY CHURCH OF ST. MARY OVERIE, SOUTHWARK.

By FRANCIS T. DOLLMAN, *Associate*.

[*Additional Paper not read at a Sessional Meeting.*]

ACCORDING to Stow, the historian, a religious house of Sisters existed on the spot long before the Norman Conquest, and was known as "The House of St. Marie-over-the-rie, that is, on the bank of, or over the river." The house was supported from the profits of a ferry across the river, before the first bridge, a structure of timber, was erected. It is supposed to have afterwards become a college of priests, founded by Swithun, Bishop of Winchester, in the latter half of the ninth century, and it probably shared the fate of many other religious houses during the ravages of the Danes before the Conquest.

In 1106 the church was again founded for Canons regular of the order of St. Augustine, by two knights, William Pont de l'Arche and William Dauncey.

Bishop Giffard of Winchester, who returned to England from exile in 1107, gave great assistance towards rebuilding the nave previous to his death in 1129. A great fire in Southwark destroyed the church in 1213, and after Giffard's death the work of re-construction was carried on by Bishop Peter de Rupibus during the early and middle parts of the thirteenth century. His work was very extensive, and comprised the nave and its aisles, the choir and retro-choir, and the chapel of St. Mary Magdalene on the south side of the choir. The lower part of the eastern and western walls of the tower were also Peter de Rupibus's work. In 1273, Walter Giffard, Archbishop of York, promised a thirty days' indulgence to all who should assist in the good work, the result of which was the erection first of the north, and subsequently of the south, transept. The Lady-chapel was built in the second compartment (from the south) of the four bays into which the retro-choir was from north to south divided, about the middle of the fourteenth century.

At the beginning of the sixteenth century, the last work of decoration was bestowed on the building by Bishop Fox of Winchester, by the erection of the reredos.

These days of prosperity were not destined to be of long duration, as the period of the destruction of the beautiful abbeys and monastic buildings in England speedily followed. By arrangement with the all-powerful and utterly unscrupulous "Defender of the Faith," our eighth Henry, the Priory Church of St. Mary Overie became a parish church,

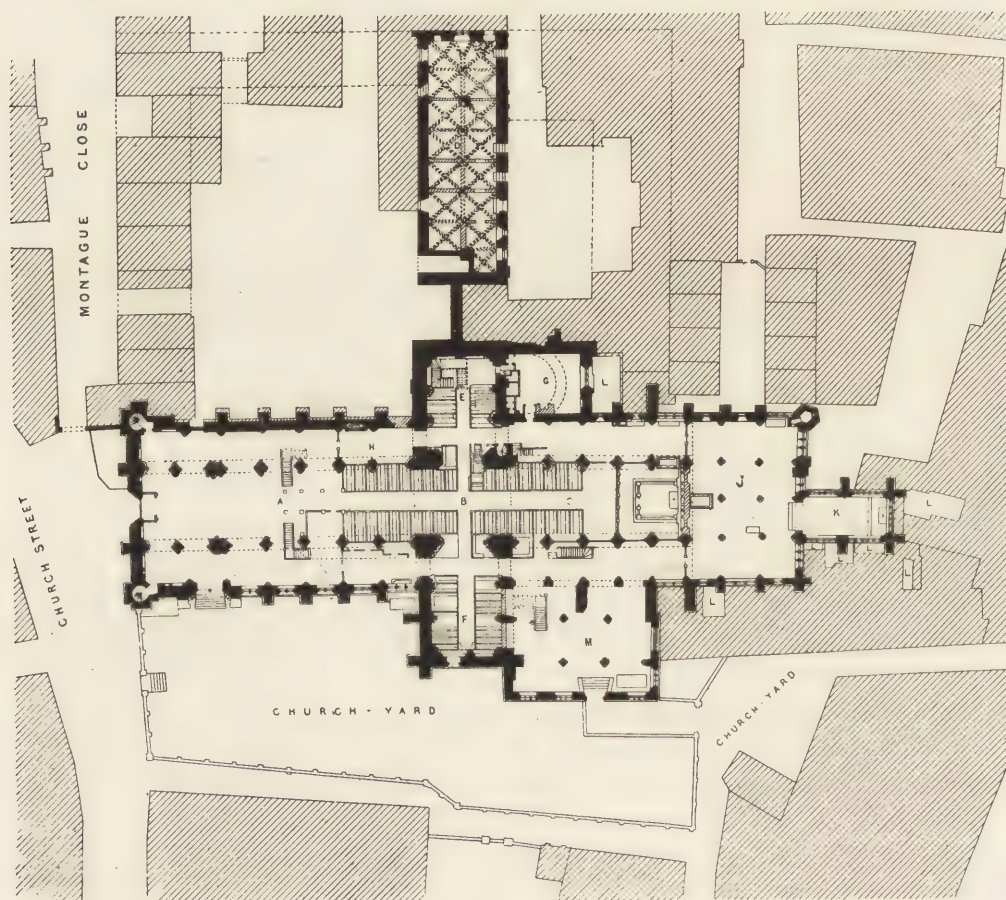


FIG. 192.—GROUND PLAN OF THE CHURCH AND SURROUNDINGS.

Showing the ancient nave, pews, &c., finally destroyed in 1839; also the Chapel of St. Mary Magdalene, destroyed in 1822; and the Lady-chapel (commonly known as the Bishop's Chapel), destroyed in 1830; with a block plan of the surrounding buildings—reduced from the plan (2 and 2a) in Mr. Dollman's *The Priory of St. Mary Overie, Southwark*. Fo. Lond. 1881.

A, The old Nave. B, Tower. C, Choir. D, Part of the Priory Buildings demolished in 1835. E, North Transept. F, South Transept. G, Sacristy. H, Chapel of St. John. J, Retro-choir, commonly known as the Lady-chapel. K, The Lady-chapel, commonly known as the Bishop's Chapel. L, Open area. M, Chapel of St. Mary Magdalene.

and its monastic features were suffered, through neglect and ill-usage, to become a ruin and a desolation. The condition of the building, through the seventeenth and eighteenth centuries, gradually went from bad to worse, till about the year 1821, at which time the doubt was not so much how long it would stand, but how soon it might collapse altogether. Public opinion was, however, aroused sufficiently to prevent the



occurrence of so dire a catastrophe, and the late George Gwilt, then an architect of eminence, was called in to take counsel with the parishioners on the subject, the result



FIG. 193.—VIEW OF THE NAVE FROM THE WEST PRIOR TO 1818. (From Moss and Nightingale's book.)



being that the tower, then in an especially unsafe state, was rendered secure; the choir, to a great extent, was reconstructed; and in 1832 the so-called Lady-chapel (or rather retro-choir) was rescued from the entire demolition which had been threatened on the part of some of the parishioners, and was carefully restored by Gwilt. In the year 1835, the "restoration" of the transepts, which were in a most deplorable condition, was entrusted to Robert Wallace. A spirit of so-called economy (not with



FIG. 194.—SECTION OF THE NAVE.\*

(From a measured drawing by Edward I'Anson, sen., and George Gwilt.)

the concurrence of the architect) was then most unfortunately in the ascendant, and as the inevitable result has been that, after less than fifty or sixty years, the need of considerable further renovations has become painfully apparent.

In 1833 the condition of the nave began to cause much uneasiness, and after careful professional report by two eminent surveyors, the roof and walls were found to be insecure. The roof was soon afterwards removed, and subsequently the walls were demolished to a height of about six feet from the floor. The nave remained in this melancholy condition till, after one or two projects for its reconstruction, which had proved fruitless, the designs of a local architect, Mr. Rose, were selected,

\* The original drawing, which was presented to the Institute in 1845 by the late Edward I'Anson, jun., President 1885-87, is in the Library.



and a new nave appeared in the most approved "pure Gothic style" of the period. This new nave was consecrated in 1839, and was considered sufficient for parochial needs till about a year ago, when increased interest in the venerable fabric was taken by the Bishop of the diocese, Dr. A. W. Thorold, and the more influential members of the parish, and it was determined once more to rebuild the nave, but this time faithfully and strictly on the old lines of the building. The carrying out of this most important and interesting work has been placed in the hands of Sir Arthur W. Blomfield, A.R.A.; and the first stone of the new nave was laid by the Prince of Wales on 24th July 1890.

The plan of the church consisted of nave with aisles, and a very enriched south porch, central tower, north and south transepts, without aisles; choir with aisles, and sacristy on the north side; the church or (after the middle of the sixteenth century, when it was united to the main building) the chapel of St. Mary Magdalene; the retro-choir, divided from north to south into four bays, and from east to west into three bays; and the Lady-chapel, opening eastward from the retro-choir.

*The Nave.*—This was divided longitudinally into seven bays, the piers being alternately circular and octagonal. The second piers on the north and south sides (from the west) are considerably larger than the others, suggesting the possibility that a western tower was at one time contemplated, but which scheme had been soon abandoned. There was a noteworthy difference in the design of the two westernmost bays of the nave (more especially in the triforium) from the other bays. A reference to Plates 9 and 17 in the last edition of my work \* on the Church of St. Mary Overie will be found to indicate these points of difference. The great size of the respond at the west end of the nave, of Semi-Norman or very early First Pointed date, seems also to favour the suggestion as to the original intention of a western tower. In the westernmost bay an arcading of early First Pointed date went round the north, south, and west sides; there would seem to have been no western door till the fifteenth century, so that the arcading in the west side was continuous. In the sixth bay from the west was the tomb of John Gower, the poet, the vault under which was opened to view a few weeks ago. Adjacent to this, in the easternmost bay, there had been in all probability a fireplace,



FIG. 195.—SOUTH ELEVATION OF THE NAVE, AS IT APPEARED BETWEEN 1831 AND 1839.

(From Mr. Dollman's book.\*)

\* *The Priory of St. Mary Overie, Southwark; comprising I. The History. II. The Description. III. The Illustrations; of the Church and Conventual Buildings.* By Francis T. Dollman. Fo. Lond. 1881.

the back of which, recently discovered, was formed of tiles laid diagonally in a "her-ring-bone" pattern. The projecting flue over this fireplace existed till the wall was taken down, in 1833. At the eastern extremity of this aisle was the prior's entrance from the cloisters, a rich example of late Norman (probably Bishop Giffard's) work. The jambs and bases are in a tolerably perfect condition, but with evident marks of fire, probably that of the year 1213, upon the masonry. A cast of the arch-mould is to be seen at the Architectural Museum, Westminster. On the eastern jamb of this doorway are two circular panels, one over the other, containing roughly incised crosses. It is doubtful whether these can be regarded as consecration crosses, although they have been sometimes so described. On the south aisle, in the second bay from the west, the chief entrance to the church has been through a some time highly enriched porch,\* over the arch of which was originally a statue of the Blessed Virgin, in whose honour the church was dedicated. The foundations of this porch have been laid bare during recent excavations, as were also those of the prior's and monks' entrances on the north side. The interior level of the floor of the Norman church appears to have been about 4 feet below the level of the tower floor, while exteriorly there is a depth of 6 feet below the tower floor. The level of the thirteenth-century nave was about 1 ft. 7 in. below the tower floor. In Richard II.'s reign a fire did some injury to the nave, but this was soon repaired, and two-light windows of late fourteenth-century date were substituted for the original single-light windows of the thirteenth century. It is somewhat doubtful whether there had been flying-buttresses to the nave, similar to those of the choir; no traces of these have been discovered, but their omission may probably have led to the fall, in 1469, of the thirteenth-century stone-groined roof of the nave. The roof afterwards erected was of very different construction. It was of oak, and had large bosses at the intersection of the ribs, many of which are still preserved in the retro-choir. The easternmost window of the south aisle of the nave differed from the rest in being of three lights, and Decorated in character.† Under this window, about a foot below the pavement, a stone coffin was discovered in 1798. This easternmost bay was doubtless a chapel, with an altar at its eastern end. At the triforium level, in the easternmost bay of the nave, the arcading had been taken out, and a segmental arch substituted on both the north and south sides in the Decorated period. Probably these arches gave access to the rood-loft.‡

*The Tower.*—Of the four lofty arches supporting the tower, two—viz. those on the west and east sides—are of thirteenth-century date, while those on the north and south sides, opening into the transepts, are of Decorated fourteenth-century character. The bases of the arches on the north side of the tower are raised several feet above the level of the floor, showing that probably a screen enclosed the whole of the north transept. This has traditionally been known as St. Peter's Chapel. Above these arches, but concealed by a ceiling, is an arcade round the tower, of Decorated date. Above this, again, is the ringing floor, and higher still, the belfry stage, in

\* *The Priory of St. Mary Overie*, Pl. 15.

† *Ibid.* Pl. 16.

‡ *Ibid.* Pl. 18.



which are twelve very musical bells. These two floors are of Perpendicular character, and the upper one was not finished till the beginning of the sixteenth century.

*The North Transept.*—This was built before the south transept, and is of Decorated character. The north window is entirely modern, and was designed by Wallace. The groining also is modern.

*The South Transept.*—This was erected about the middle of the fourteenth century, but its present condition is to a great extent modern. The south window is entirely modern, from a design by Wallace; one of the arches on the east side of the transept originally opened into the chapel of St. Mary Magdalene; the other arch on the east side is now filled with the monument of John Gower, the poet. On one of the main piers, on the east side of this transept, are the arms of Cardinal Beaufort, who was a liberal contributor during the erection of this part of the church.

*The Choir.*—The whole of the choir is Peter de Rupibus's work, and is a most excellent example of thirteenth-century detail at its best period. Some existing remains show that, previous to the erection of the reredos, the triforium arcade was continued round the east end; beneath were two arches, originally opening into the retro-choir, but afterwards blocked by fourteenth-century panelling of the time of Edward III., and afterwards by the reredos. The reredos, by Bishop Fox, is a noble work, similar in its general treatment to the examples at Winchester and St. Albans Cathedrals, Christchurch Priory in Hampshire, and the chapel of All Souls College, Oxford. On taking down the "altar-piece" (said to have been erected from the designs of Sir Christopher Wren), in 1834 or 1835, the original reredos, in a most dilapidated condition, was discovered; it was restored to its present condition by Wallace.\* Opening from the north aisles of the choir is the sacristy. Discoveries were made on the exterior about the year 1847, which showed that this was one of the oldest portions of the church, viz. of Norman date, and it is probable that further investigations will also develop traces of Norman work in the lower part of the north transept. The chapel of St. Mary Magdalene† stood on the south side of the choir. It was originally founded by Peter de Rupibus in the thirteenth century, and in its original state was the church of the small parish of St. Mary Magdalene; but when in the sixteenth century the priory became the parish church, it was united to it in a very clumsy way. Views of the interior and of the exterior are given in Moss and Nightingale's work, 1818, showing how the junction was effected. It was very much altered in the Perpendicular period. It was divided longitudinally into nave and aisles.

*The Retro-choir.*—This most beautiful portion of the building was part of the work of Bishop Peter de Rupibus. It has generally, but most erroneously, been known as the Lady-chapel. Its situation occupies the space behind the high altar, similarly to that in many of our cathedrals—among the rest, at Winchester, Salisbury, Wells, and Exeter—and is always known as the retro-choir, ambulatory, or procession

\* *Ibid.* Plates 31a and 32.

† *Ibid.* Pl. 26.

path. More than one altar is known to have existed here, including one at the north-east, and another at the south-east angle of the building.

*The Lady-chapel.*—This opened eastward from the retro-choir in the second bay from the south. It was a structure of the middle of the fourteenth century, and consisted of two bays, with groined roof, the windows being filled with "reticulated" tracery. It was formerly known as the "Bishop's Chapel," from the circumstance of Bishop Lancelot Andrewes of Winchester having been buried there in 1626. The chapel fell into great decay, being much injured by a fire in 1676; and when the approaches to the new London Bridge were in course of construction, it was pulled down, and the tomb of Bishop Andrewes was removed to the west side of the retro-choir, behind the high altar, where it still remains.

*The Cloisters.*—No remains exist. They were on the north side of the nave, where Montague Close now stands. Many fragments, however, existed till 1835, chiefly of Perpendicular character. A building, possessing considerable interest, was on the east side of the cloisters, which was fully described by a well-known archæologist of that period, E. J. Carlos, in *The Gentleman's Magazine* for June 1835.\*

Two other monuments deserve record :—

1. John Gower, the poet.—This tomb was removed in 1832 from its original position in St. John's Chapel, in the north aisle of the nave, when the latter was unroofed, into the south transept, where it remains. It was considerably renovated at the expense of the late Duke of Sutherland, at that time Lord Francis Leveson Gower, under the superintendence of Edward Blore, the architect. John Gower had been a considerable benefactor to the church.

2. The oaken effigy in one of the recesses in the north aisle of the choir.—Probably these two recesses are the last resting-places of two of the priors. The effigy now in one of them is supposed to commemorate one of the De Warren family. At the early part of the last century, it is stated to have been placed, almost as lumber, in a recess of the north aisle of the nave. Thence it was transferred to the north transept, where, being placed upright, it formed the support of a gallery. In Seymour's *History of St. Mary Overie's Church*, 1734, the following passage occurs :—"Here, against the north wall, is placed the antient figure of a Knight Templar, cross-legged, in armour, with his dagger drawn in one hand, and holding the sheath in the other. *It is new painted and flourished up, and looks somewhat dreadful!* It probably represents one of the De Warren family, who were great benefactors to the church, and its date is "about the reign of Edward II." It was renovated some years ago by the late Mr. Richardson, who restored the effigies in the Temple Church. From notes taken by Mr. T. Simpson, clerk of works for Sir Arthur W. Blomfield, A.R.A., during the recent excavations, I have learned that (1) The old walling stones and plinth to the south wall were then discovered. (2) On the north and south walls of the nave were found portions of the old groining-shafts and their bases, of Purbeck marble, resting on a stone-course

\* *The Priory Church of St. Mary Overie*, pp. 24-28.

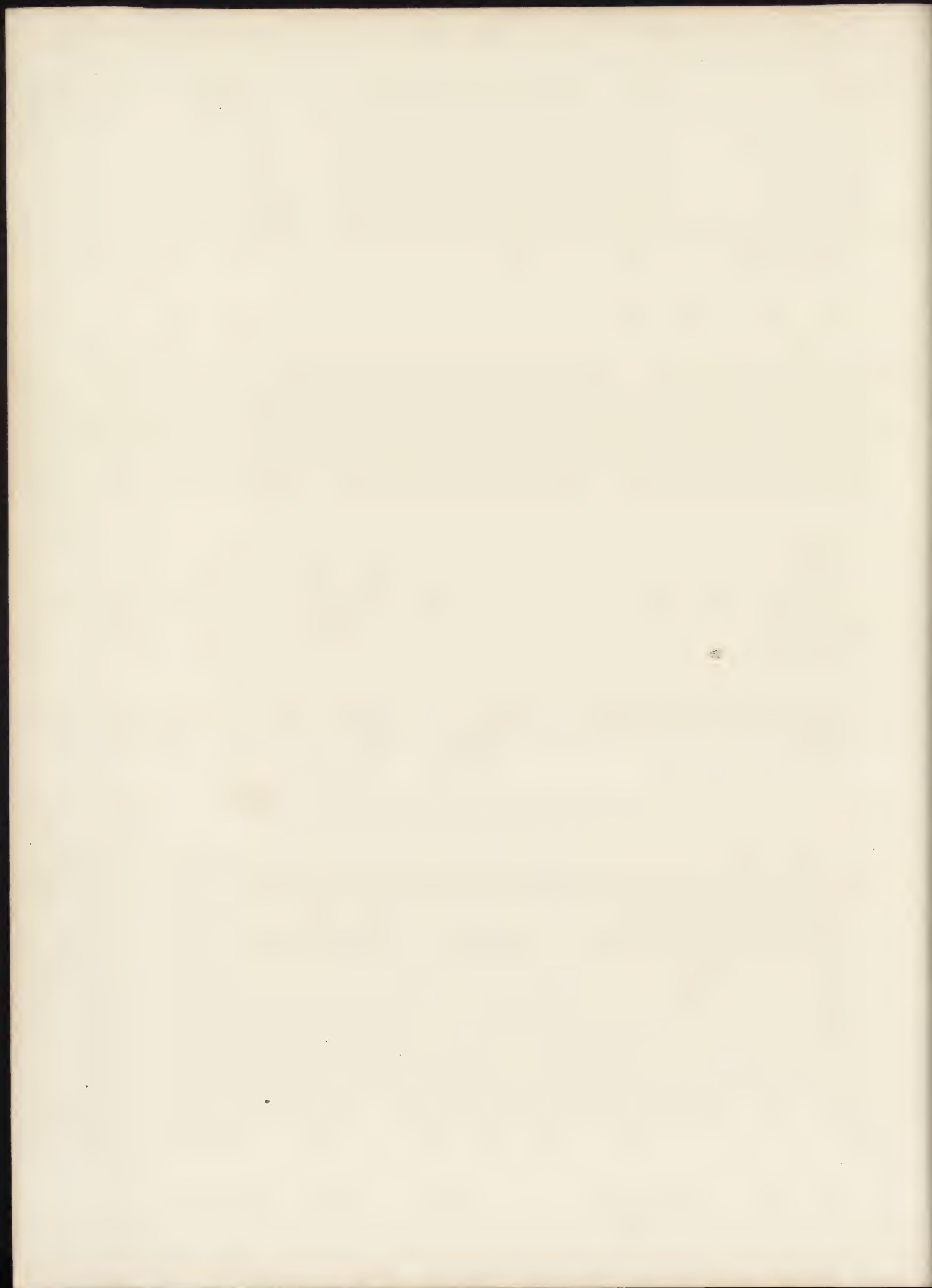


blocking under which is rubble masonry, down to what was an earlier floor, about 1 ft. 7 in. below the floor of the transepts and tower, and projecting 1 ft. 5 in. from the inner face of the wall. Also, on taking down the modern brickwork, remnants of the old Purbeck plinths, indicating the position of the piers to the nave arcading, were found. The subplinths are in Godstone firestone, and are all below the level of the datum. It would also appear that the detached shafts, bases, and strings were all in Purbeck marble.

Mr. Simpson found all the recesses, arches, &c., on the north aisle of the nave, as nearly as possible in the position shown in the plates of my book, and he took especial notice of the herring-bone arrangement of the tiles forming the back of the fireplace near the prior's door. One curious feature of the west wall is that there is a regular fall of 4 inches from south to north in the length of the wall. In a recess at the west end, on the north side of the respond, is what would seem to have been a floor of figured tiles, the level of which is 7 inches higher than the supposed level of the earlier (or semi-Norman) floor, and partly burying the bases of the shafts. Most of the fifteenth-century west doorway has been found. The doorway and part of the walling and steps in the south-west stair-turret have also been discovered, clearly showing its exact size. Much of the south porch has also been laid bare; some of the bases are in a fairly good state of preservation, and all are of Purbeck marble. The shafts to this doorway, from fragments that were found, would appear to have been of various coloured marbles. On either side of this porch, inside, were found fragments of bases of apparently Norman work, and which are on the same level as the responds at the west end.

In conclusion, I wish to add that the Guildhall Library contains a volume of most valuable and beautifully executed drawings, chiefly by T. C. Buckler, representing the Southwark of 1827, and intended to illustrate Pennant's *Account of London*. They are tinted in sepia, and in respect of accuracy of perspective are as correct as could possibly be rendered by the best photography of the present day.

FRANCIS T. DOLLMAN.





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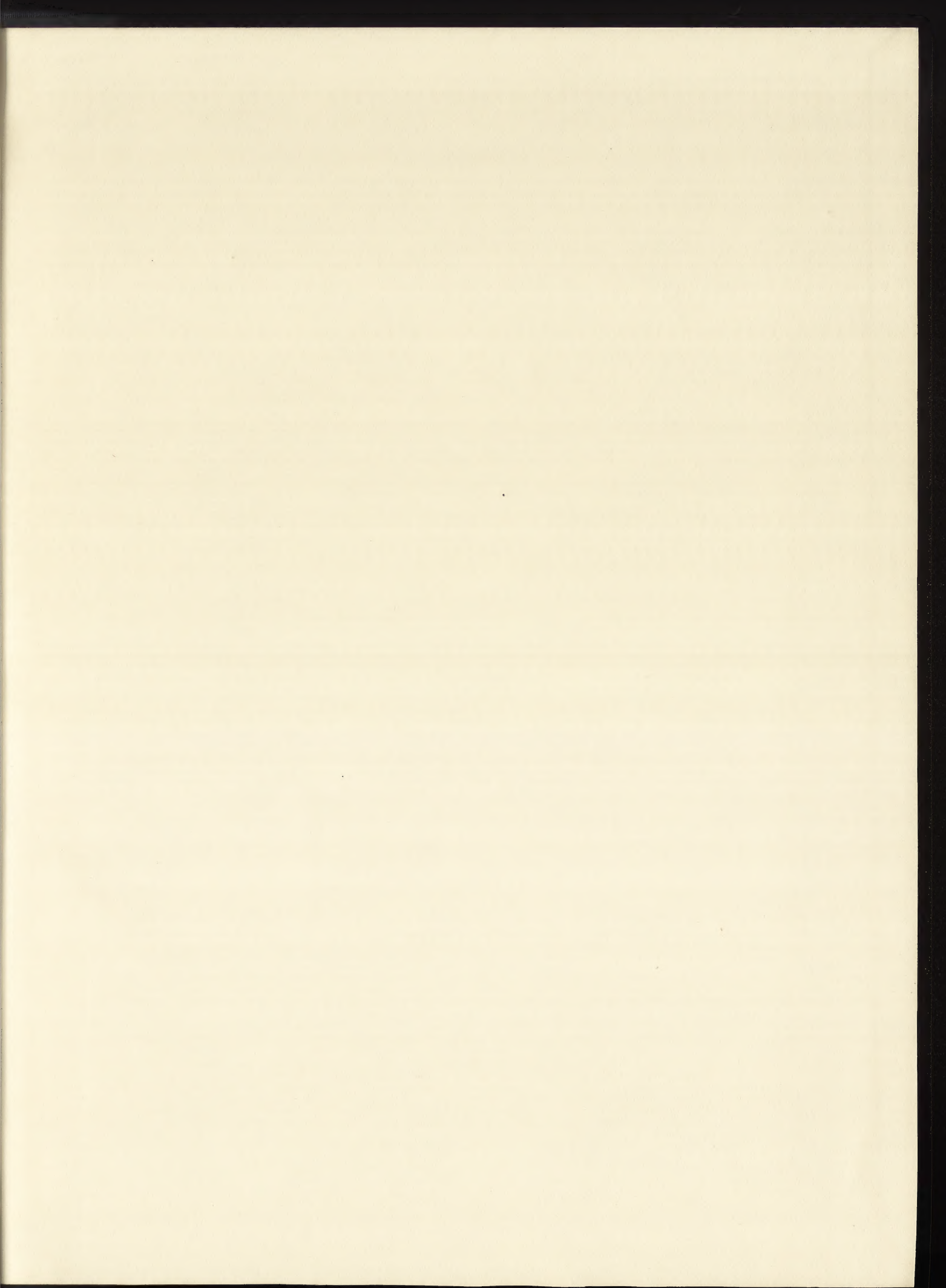
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